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Connecting Israel's tech ecosystem

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T: +972 73713 6313 / iati@iati.co.il / www.iati.co.il
Herzliya Pituach, Israel
Dear Friends,

The IATI 2018 Report: Israel's Life Sciences Industry allows a double perspective on the Innovation Nation’s life science industry: The Report provides a view of the industry including its sub-sectors, trends and influences; and refers to the time axis – as it examines long term processes (such as the future of HR in life science), and compares the data to the previous year. The continuity, the annual comparison and the long-term view, all make the Report the most comprehensive take on the Israeli Life Science Industry - a growing force within the global healthcare market.

This flourishing Industry keeps thriving in the recent years, backed by Government support and continuous academic excellence. As the local eco-system continues to grow and flourish, each sector is getting stronger – Academy, Industry, Incubators, STEM Education, VC funds and Government support. This strong ecosystem keeps growing: while 2016 was a year of mixed trends, the Report finds that 2017 shows positive trends in almost all parameters: more funding, larger acquisitions, more mature companies, more mergers and acquisitions and more global interest.

It is no coincidence that this Report comes out towards our MIXiii-BIOMED conference 2018, an annual celebration of the great innovation and new capabilities, abilities and attraction of the Israeli Life Science sector, on a global scale.

As the Israel's Umbrella Organization of the High-Tech & Life Science industries, IATI believes 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.

This unique Report provides an in-depth view of the local industry, and is intended to be used as a tool for better Industry, Government and Academic decisions. We hope that you will find it informative and helpful. We encourage you to share it with others.

We would like to warmly thank the Israeli Innovation Authority for supporting this Report and for partnering with us on promoting the industry throughout the year; Claudio Yarza, Partner, Pharmaceuticals & Life Sciences Leader, and Omer Gavish, Partner at the Life Science practice in PwC Israel, for all the support in preparing this Report; Gil Gurfinkel, leader of Medison Biomed, for his contribution on putting together the Incubators chapter; Teva Pharmaceuticals and ZAG Law Office, for their great support. Finally, we thank the IATI team who worked day and night to make this Report complete.

Here’s to another year of innovation and growth!

Karin Mayer Rubinstein
CEO & President, IATI

Yaky Yanay
Co-Chairman, IATI
Therapeutics President, Pluristem

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**Executive summary**

The Israeli life science industry continues to grow and improve its global position. Not only that the number of companies established is increasing every year, but also more and more companies continue to move forward from the seed stage into more advances stages, contributing to the industry’s experience and maturity. The Israeli entrepreneurs ability to take advantage of the excellence in academic research, wide government support and innovative echo system, contributes to the industry’s success.

Following a year of mixed trends, 2017 showed positive trends in almost all parameters. Increase in the total number of life sciences companies, in total and average amount raised and in the activity in both the public and private markets. This year we have also seen the largest acquisition ever of an Israeli life science company and the first of over one billion dollar. This is another indicator to the higher maturity of the Israeli life science industry and to its growing global presence.

Winds continue to change when it comes to the Israel life science industry sub sectors. While the share of medical device sub sector, which is traditionally the largest sub sector in the industry, continues to shrink, the digital health and therapeutics sub sectors continues to grow. This trend is expected to continue in the coming years, and received another tailwind from the recent National Program for Promoting the Digital Health Field. The program will allow startups to have access to digitally stored medical data and perform big data research based on this medical data. This is a fertile platform for Israeli digital health companies and a great advantage compares to other companies around the world.

The National Program for Promoting the Digital Health Field is the last example of the Israeli government support in the hi-tech and life sciences industries. Together with the awakening in the markets and the advantages structured in Israeli life science companies, we are confident that the Israeli life science industry will have a leading role in the global life science industry, and that Israeli companies will stand in the industrial front.
Israel’s Life Sciences Industry

As of today, approximately 1,450 life science companies are active in Israel (Figure 1), employing more than 85,000 people, an increase of approximately 50 companies and 10,000 employees compared to prior year. These numbers are based on multiple different databases and our own estimates. As many as 1,307 life sciences companies were established in Israel in the last decade (2008-2017), or 131 companies every year in average (Figure 2), and half of them are still active.

Figure 1 - Cumulative number of active life science companies

![Cumulative number of active life science companies](image1)

Source: IATI, IVC-Online Database

Figure 2 - Number of Israeli life sciences companies established (2008-2017)

![Number of Israeli life sciences companies established (2008-2017)](image2)

Source: IATI, IVC-Online Database

1 Including employees in Israel and in branches outside Israel.
In the same decade, 654 life sciences companies ceased to operate for various reasons, or 65 companies a year on average. Although the number of companies established has decreased in the last 3 years, the number of companies that ceased operating on those years has declined in a greater degree (62% in 2017 - lower than this average - see Figure 3).

**Figure 3 - Number of Israeli Life Science Companies Discontinuing Operations (2008-2017)**

Source: IATI, IVC-Online Database

The percentage of companies in advanced stages out of the active life science companies is stable, and is 39 percent in 2017 - similar to prior year. Of these companies, 35% are in the initial revenues stage and 4% are in the revenue growth stage (Figure 4). The remaining sixty-one percent of the companies are mainly in R&D stages, which are 50% of the total active life science companies (similar to prior year).

**Figure 4 - Number of Active Israeli Life Science Companies by Stage**

Source: IATI, IVC-Online Database
Israel Life Sciences Industry Sub-Sectors

Although the number of medical devices companies in the Israeli life sciences industry has increased in 2017, their share of the overall life sciences industry continues to decrease, with 40% in 2017 compared to 42% in 2016. Healthcare IT and therapeutics remains the next largest sub-sectors with 255 and 202 companies, respectively, representing approximately 31% of all life science companies (similar to prior year) (Figure 5). The share of Agrobiotech companies, although still not significant, had the most significant increase, from 3% in 2016 to almost 5% in 2017.

Figure 5 - Israel Life Sciences Industry Sub-Sectors

Source: IATI, IVC-ZAG High-Tech Capital Raising Survey
Israel Healthcare IT and Digital Health

More than half of Israeli health IT and digital health companies were established in the last six years, with an average of 36 per year (Figure 6). Of these companies, 353 companies are still active (Figure 7). Seventy percent of the companies are relatively small, with less than 10 employees, about 25% have 10-50 employees and very few, about 5%, are relatively large companies with more than 50 employees.

Figure 6 - Number of Israeli Health IT and Digital health Companies per Year Established

Source: IATI

Figure 7 - Number of Active Israeli Health IT and Digital health Companies per Year Established

Source: IATI
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Israel High-Tech Funding

The Israeli life sciences industry has several sources of funding, among them are the Israel Innovation Authority, venture capital funds (Israeli and foreign), micro-funds, corporate investors, IPOs (mainly the NASDAQ and other foreign stock-exchanges) and angels. 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.

Israeli high-tech companies raised an all-time annual high of $5.2 billion in 2017, superseding the prior all-time annual high recorded in 2016 by $0.4 million, or 9%, this is according to the IVC-ZAG Survey Q4/2017. The main reason for the increase was four large deals of over $100 million each (Cybereason, Via, Lemonade and Skybox), representing 12% of the total amount raised. The decrease in the number of deals continues in 2017, including a decrease of 17% in the number of deals in seed stage companies. As a result, the trend of increase in the average financing round, continues for the sixth consecutive year, reaching $8.5 million in 2017, which is a $1.3, or 18% increase compared to 2016 (Figure 8).

Figure 8 - Capital Raised by Israeli High-Tech Companies

Source: IVC-ZAG High-Tech Survey 2017
In a global perspective, we see a similar trend in the US. According to the MoneyTree Report by PricewaterhouseCoopers LLP (PwC) and CB Insights, venture capital investments grew between 2012 and 2017, reaching their highest level since 2015 - $71.9 billion in 5,052 deals in 2017. Funding has increased by 17% from 2016, while the number of deals decreased by 4%, declining for the third consecutive year.

Figure 9 - PwC-CB Insights MoneyTree Report - Total equity investments into venture-backed companies

![Figure 9](source)

Source: PwC MoneyTree Report Q4 2017, CB Insights

According to the OECD's Entrepreneurship at a Glance 2017 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, in the majority of OECD countries, venture capital constitutes a very small percentage of GDP (usually less than 0.05%), while Israel's level of expenditure by VC investments in 2016 remains higher than all other OECD members, representing more than 0.35% of GDP (Figure 10).

Figure 10 - Expenditure by VC as a % of GDP (2016, or latest available year)

![Figure 10](source)

Source: Entrepreneurship at a Glance 2017, OECD
According to the IVC-ZAG High-Tech Capital Raising Survey, the life sciences sector funding continues to grow, attracting funding of $1.2 billion in 2017, which represents 25% of the total investments in Israeli high-tech. Over the last decade, the life sciences sector got an average of 26% of the total investments in Israel high-tech (Figure 11).

The funding of $1.2 billion was invested in 135 life science companies, a minor drop of 1.5% in the number of companies compared to 2016. The average funding per company increased significantly in 2017 compared to 2016, and is approximately $8.86 million, which is more than double than the average for 2008-2016, and slightly higher than the average investment in high-tech companies. Total investments in life sciences companies in 2017 increased by 40% and is also above the average in the last decade (Figure 12).
The trend described above is in line with the investment trend in the US. According to the MoneyTree™ Report by PricewaterhouseCoopers LLP (PwC) and CB Insights, US investors contributed $15 billion to the healthcare sector in 755 deals in 2017. Over the last 20 years, healthcare is the second largest high-tech sector by dollar amount in the US. In addition, the healthcare deal share was greater than the deal share of Mobile & Telecom activity in 2017, which is traditionally the second largest sector by deal-value (Figure 13).
Breakdown of life sciences investment sources in Israel

As mentioned before, total investments in life science companies in Israel in 2017 was $1.2 billion. Of that amount, $141 million was invested by Israeli venture capital funds, which represents 12% of the total investments in Israeli life sciences companies (similar percentage as in prior year). The amount invested by VCs in Israeli life sciences companies in 2017 is above the average investment in the last three years, while the percentage of total investments is equal to the average. VC investments trend remains stable over time, while overall life sciences investments are relatively volatile. (Figure 14).

Figure 14 - Capital Invested by Israeli VC Funds vs. Other Investors in Life Sciences (2008-2017) - $ millions

Source: IVC-ZAG High-Tech Capital Raising Survey

In 2013-2017, we see a continued increase in the amounts invested by Israeli investors. In 2017, Israeli investors contributed $476 million, representing 40% of total investments in Israeli life sciences companies, and up from $323 million, or 47% in 2016. We can see that interest in the Israeli life sciences sector by both local and foreign investors, is growing for the fifth consecutive year (Figure 15).
Figure 15 - Capital Invested in Israeli Life Science Companies: Israeli vs. Foreign Investors (2013-2017) - $ millions

Source: IVC-ZAG High-Tech Capital Raising Survey

The increase in non-VC-backed life sciences investments continued in 2017, where $393 million, or 33% of total investments in Israeli life sciences companies, were non-VC backed investments, compared to $381 million, or 45% in 2016. Although the VC-backed investments in Israeli life sciences companies declined in 2016 for the first time in a decade to an amount of $470 million, we see a significant increase of more than 70% in the VC-backed investments in 2017 to an amount of $803 million (Figure 16).

Figure 16 - VC-Backed vs. Non-VC-Backed Life Science Financing (2008-2017) – $ millions

Source: IVC-ZAG High-Tech Capital Raising Survey
The trend of increase in the share of investments going to later stage companies (initial revenues and revenue growth) continues in 2017, as well as an increase in the number of deals. Another trend that continues in 2017 is the increase in the amounts invested in deals of more than $20 million, which reached to an all-time annual high of $656 million (Figures 17 & 18).

**Figure 17 - Capital Raised by Israeli Life Sciences Companies by Stage (2008-2017) - $ millions**

Source: IVC-ZAG High-Tech Capital Raising Survey

**Figure 18 - Capital Raised by Israeli Life Sciences Companies by Deal Size (2008-2017) - $ millions**

Source: IVC-ZAG High-Tech Capital Raising Survey
We can see that the total number of deals in 2017 is similar to 2016 (Figure 19). The number of deals in Israeli life science financing involving R&D stage companies is still the largest, although it still didn't go back to its level in 2012-2015. After three years of approximately 30 deals per year, we see a decrease in the number of deals involving seed stage companies to the lowest level since 2014. The number of deals involving later stage companies did not change significantly in 2017, with a minor decrease in deals for initial revenues companies and a minor increase in the number of deals for revenue growth companies.

Figure 19 - Number of Israeli Life Science Financing Deals by Stage (2008-2017)

Source: IVC-ZAG High-Tech Capital Raising Survey

The average deal size increased significantly in 2017, reaching a record average of $8.86 million, and continues the trend seen since 2009 (Figure 21). It is interesting to see that for the first time in the last decade, the average deal size went up for companies in all stages and is significantly higher than the 10-year average. The average deal size for seed companies more than doubled compared to prior year, and for companies in R&D and initial revenues stages the average deal size reached its highest level in the last decade. (Figure 20).
Figure 20 - Average Deal Size in Israel Life Sciences Financing by Stage (2008-2017) – $ millions

Figure 21 - Average Deal Size in Israel Life Sciences Financing (2008-2017) - $ millions

Source: IVC-ZAG High-Tech Capital Raising Survey
The main five sub-sectors in the life sciences industry did not change in the last few years, and are medical devices, biotech/pharma (including agrobiotech and therapeutics), diagnostics, healthcare IT (including telemedicine and bioinformatics) and the "others" sub-sector.

As can be seen in Figures 22 and 23, the medical device sub-sector keeps attracting the majority of the life sciences investment in 2017, both in terms of amounts invested and the number of deals, although the latter metric decreased in 2016 and 2017. In addition, the share of the medical device sub-sector continues to decrease and reached an all-time annual low of 41%. Biotech/pharma remained the second largest sub-sector in 2017, in both amounts invested and number of deals and grew in both of these parameters in 2017.

The third largest sub-sector remains the Healthcare IT, which is still growing in terms of value of deals. As we already discussed in our prior report, some of the medical device companies can also be included in this report under the definition of digital health because they are developing products like biosensors, etc. As such, the actual amount invested in digital health companies in 2017 is probably higher than $145 million (as presented in Figure 22). We also can see a record investment in the Diagnostics sector in 2017, with $109 million in nine deals.

Figure 22 - Israeli Life Sciences capital raised by Sub-Sector - $ million

Source: IVC-ZAG High-Tech Capital Raising Survey
Figure 23 - Israeli Life Sciences capital raised by Sub-Sector (# of deals)

Source: IVC-ZAG High-Tech Capital Raising Survey
Most Active Life Sciences Investors in Israel

According to the IVC Research Center, as well as publically available data, OrbiMed Israel Partners and Pontifax remains the two top-most active life sciences investors in Israel in the last three years (excluding investments by incubators)\(^2\), with 21 and 219 investments in that period, respectively. Interesting is the emergence of aMoon Partners, a relatively young VC (commenced operations in 2016), which is the most active investor in 2017 with 11 investments (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>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></td>
<td>FutuRx Ltd.</td>
<td>Incubator</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>OurCrowd Management Ltd.</td>
<td>Angel Club/Group</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Zaitoun Ventures</td>
<td>Advisory/Management Company</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NGT3</td>
<td>Incubator</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Triventures III</td>
<td>VC Fund</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Virtus Inspire Ventures (VI Ventures)</td>
<td>VC Fund</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Trendlines Incubators Israel</td>
<td>Incubator</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Van Leer Xenia Ventures (VLX Ventures)</td>
<td>Incubator</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

\(^2\) The report presents a list of investors who participated in financing rounds of Israeli and Israel-related life science companies 2015-2017. Investors include the following types: accelerators, angel club/groups, corporate investors, incubators, investment companies, private equity funds, VC funds; Foreign and Israeli investors included. Investors are referred to as individual entities, event when managed by a single entity (such as individual funds as opposed to management companies). The investors are ranked based on two measures: # of First Investments, then Total # of Investments. The number of investments in both measures reflects investments made in the relevant year. Total # of Investments refers to the entire number of financing rounds in which the investor participated in a given year, including first and follow on investments.
<table>
<thead>
<tr>
<th></th>
<th>Incubator/VC Fund</th>
<th>2016</th>
<th>2017</th>
</tr>
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<tr>
<td>1</td>
<td>Trendlines Incubators Israel</td>
<td>Incubator</td>
<td>8</td>
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<tr>
<td>2</td>
<td>Pontifex IV LP</td>
<td>VC Fund</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>Incentive Technological Incubator Ltd.</td>
<td>Incubator</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Alon MedTech Ventures Ltd.</td>
<td>Incubator</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>OrbiMed Israel Partners II</td>
<td>VC Fund</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>aMoon Partners Fund I</td>
<td>VC Fund</td>
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</tr>
<tr>
<td>4</td>
<td>Triventures III</td>
<td>VC Fund</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Arkin Bio Ventures LP</td>
<td>VC Fund</td>
<td>3</td>
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<td></td>
<td>Gefen Capital Fund</td>
<td>VC Fund</td>
<td>3</td>
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<td></td>
<td>Johnson &amp; Johnson Innovation - JJDC Inc.</td>
<td>Corporate VC</td>
<td>3</td>
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<td>Sanara Ventures Ltd.</td>
<td>Incubator</td>
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<td>RAD BioMed Accelerator Ltd.</td>
<td>Incubator</td>
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</tr>
<tr>
<td></td>
<td>NGT3</td>
<td>Incubator</td>
<td>3</td>
</tr>
<tr>
<td>1</td>
<td>aMoon Partners Fund I</td>
<td>VC Fund</td>
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<td>2</td>
<td>Sanara Ventures Ltd.</td>
<td>Incubator</td>
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<td></td>
<td>OrbiMed Israel Partners II</td>
<td>VC Fund</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Pontifex IV LP</td>
<td>VC Fund</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>SBI Japan-Israel Innovation Fund</td>
<td>VC Fund</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Alon MedTech Ventures Ltd.</td>
<td>Incubator</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>eHealth Ventures (EHV) Ltd.</td>
<td>Incubator</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Trendlines Incubators Israel</td>
<td>Incubator</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>Israel Biotech Fund (IBF) I LP</td>
<td>VC Fund</td>
<td>4</td>
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<tr>
<td></td>
<td>OurCrowd Qure Ventures Fund</td>
<td>VC Fund</td>
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<tr>
<td></td>
<td>ZORA Ventures Special Purpose Vehicles</td>
<td>VC Fund</td>
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<td>Rimonci Capital</td>
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<td></td>
<td>Arix Bioscience</td>
<td>HT</td>
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<tr>
<td></td>
<td>Galil Ofek Innovations Ltd.</td>
<td>Incubator</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: IVC-Online Database
Israeli life sciences companies listed on NASDAQ

In the last decade, Israeli life sciences companies raised more than $3.7 billion on NASDAQ. The majority of this amount (over $2.3 billion) was raised between 2014 and 2015, when some companies took advantage of a window of opportunity for life sciences IPOs. According to the IVC Research Center, in 2017, 36 Israeli life sciences companies were listed on NASDAQ, 12 of them raised $673 million (IPOs and follow-on offerings). See Figure 24.

Figure 24 - Public Offerings* by Israeli Life Science Companies on NASDAQ 2008-2017 ($ million, # of offerings)*

The drop seen in 2016 in the number of Israeli life sciences public offerings and the amounts raised on NASDAQ is not unique to Israeli life sciences companies and was part of a global plunge in public offerings across the industry. In 2017 there is a significant increase in the amounts raised on NASDAQ by Israeli life sciences companies, a trend that we believe will continue in 2018. NASDAQ was cut in 2016 by more than 55% and the amounts raised plummeted by more than 78%. Yet, 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).
54 life science stocks are listed on Tel Aviv Stock Exchange (TASE), with more than 35 dually listed on foreign markets. Of these 54 companies, 36 companies are Israeli and the rest are foreign companies dually traded. In our opinion, Israeli life sciences companies see the TASE mainly as a stepping stone on the way to NASDAQ or another international stock exchange at a later stage. The number of funding transaction in the last few years is minimal due to general lack of industry expertise by institutional investors and insufficient analyst reporting and understanding of this industry. According to the IVC Research Center, three life sciences companies raised $17 million on TASE in 2017, via initial and follow-on offerings (Figures 25 and 26).

Figure 25 - Number of Public Life Science Companies on TASE by sector

Source: TASE

According to the TASE website - www.tase.co.il
In March 2010, TASE launched the Biomed Index, which currently includes 29 life sciences companies with the highest market cap, a decrease of five companies compared to 2016. The Biomed Index performance in the last few years is presented in Figure 27.

Figure 27 - TASE Biomed Index Performance
Other Stock Exchanges

There is a significant number of Israeli life sciences companies which 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, 3 Israeli life sciences companies raised $49 million in 2017, an increase of 29% in the amount raised compared to 2016 with the same number of transactions (IPOs and follow-on offerings). See Figure 28.

According to "Pharma, Biotech & Medtech 2017 in Review" Report by Evaluate Pharma, 50 global biotech companies listed on western stock exchanges had an IPO in 2017, raising $3,851 million ($77 million on average). The total number of floats and the amount raised by biotech flotations by IPOs in 2017 was the highest seen since 2015, representing a major pick-up for companies wishing to make their public debut, and is similar to the trend seen for Israeli companies (Figure 29).
Figure 29 - Initial Public Offerings by Quarter on Western Exchanges

Source: Pharma, Biotech & Medtech 2017 in Review, Evaluate Pharma, February 2018
Government Support

As in prior years, the government of Israel is strongly focused on creating an R&D support network through various grants and incentive programs. The Israel Innovation Authority (formerly the Office of the Chief Scientist) responsible for the country’s innovation policy, is an independent and impartial public entity that operates for the benefit of the Israeli innovation ecosystem and Israeli economy as a whole. Its role is to nurture and develop Israeli innovation resources, while creating and strengthening the infrastructure and framework needed to support the entire knowledge industry.

The Israel Innovation Authority’s mission is to strengthen the innovation ecosystem and promote innovation, entrepreneurship and disruptive technologies as a leverage for inclusive and sustainable economic growth. To this end, it provides a variety of practical tools and funding platforms aimed at addressing the dynamic and changing needs of the local and international innovation ecosystems, and operates through a variety of customized paths for entrepreneurs and companies to promote, implement and realize their innovative R&D ideas at various stages. The tools and programs offered by the Israel Innovation Authority are based on the specific stage and needs of the company, and grants range from 30% to 85% of the approved R&D expenses.

In the last decade, the Israel Innovation Authority’s invested more than $100 million annually in the life sciences sector via its different programs. This includes programs for early stage entrepreneurs (TNUFA), the Incubators program (see below), and for growth companies. The Magnet Program (Consortium of academia and industry), the Nofar and the Kamin Programs aim at bridging the gap between applied research and the industry. This is also includes, dedicated platforms that are supporting multinational corporations interested in Israeli technology, Israeli companies seeking new markets abroad, and traditional factories and plants seeking to incorporate innovative and advanced manufacturing into their businesses.
Digital Health as a National Growth Engine

Israel’s unique public health system, in which all the personal medical history of the population is managed by four HMOs, together with the diversity of the population and the innovation in the life sciences industry, is a fertile ground for big data research based on that information. Medical data has been digitally stored by the Israeli HMOs since the 1990s, documenting all types of medical information containing complete data on each patient. This database provide a comprehensive, systematic, quality data, of a stable population of patients across their lifetime. Giving access to this data to companies in the private sector will allow them to improve their research and development process, and create new and innovative tools, which in turn, will improve the health system and the treatment given to patients.

On March 2018, the Israeli government approved a $264 million national digital health program, designed to develop preventive and personalize medicine. The budget would be invested mainly in setting up a digital infrastructure for medical research and to supporting collaboration between the Israeli healthcare system and local startups operating in the sector of digital health. As part of this program, the Israel Innovation Authority will implement 5 main projects:

1. Encouraging research and development, and pilot trials, by companies and entrepreneurs in the field of Digital Health, carried out in cooperation with Israeli health organizations.
2. "Technology Innovation Labs", a newly launched track that aims to promote innovation and strengthen cooperation between multinational corporations and Israeli start-ups in the field of Digital Health.

3. Promoting cooperation agreements with international entities to supporting research and development of Israeli companies in the field of Digital Health and pilot testing.

4. Supporting the establishment of a User Association (an association of companies with a common interest in advanced technologies) in the field of Digital Health.

5. Creating a plan for converting personnel into the field of data science, with reference to the field of Digital Health.

This program also includes a new Israeli National Genomic-Clinical Initiative, led by the Israel Innovation Authority, aimed at sequencing and analyzing the genomes of 100,000 Israeli individual volunteers. Combining genomic sequence data with comprehensive clinical information, using in-depth analysis of Big-Data, will enable new medical researches and serve as a basis for drug discovery and the development of preventive and personalized medicine.

In practice, Israeli HMO's are already very active conducting big data and personalized medicine (genome related) projects in cooperation with multinational and startup companies as well as academic institutions. The plan is expected to attract more global companies and encourage them to open R&D centers in Israel. By doing that, the plan not only contributes to the Israeli startups in the life sciences industry, but also to the increase of Israel's global presence.

**The Technological Incubators Program**

The primary goal of the program is to transform innovative technological ideas from the initial stage of R&D into viable startup companies and help them reach a significant fundable milestone. The incubators program, launched in 1991, has positioned itself as the primary sponsor of startups in Israel today, supporting 60- 70 new startups every year.
Today there are 18 technological incubators and one designated biotechnological incubator (see below). The Incubators are privately owned by seasoned and experienced groups, such as venture capital funds, multinational corporations, as well as private investors. Incubators owners are selected through competitive processes for a license period of eight years and are spread across Israel.

Field of Activity

From 2008 to 2017, approximately 600 companies entered the various incubators programs, out of which 28% of the companies were medical device companies and 11% were biotech/bio-medicine companies. Interestingly, the majority of companies, operating under the incubator program in 2017 are in the life sciences sector, a relatively high-risk level for entrepreneurs and investors (Figure 31).

Figure 31 - Companies in the Incubators program by sector (2017)
Financial Support

As it pertains to life science and healthcare projects, the Israel Innovation Authority distinguishes between two separate funding tracks: the Technological Incubators track, in which the total project budget is up to NIS 3.5 million for a period of up to two years, and a dedicated Biotechnology Incubator track, in which the total project budget is up to NIS 8.1 million for a period of up to three years. For both tracks, 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.

During the years, the government sponsored over 2,000 incubated companies with a total cumulative government investment of over $750 million. Of these, over 1,800 companies have matured the incubators, 60% of them 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 5-8 dollars from the private sector.

Several successful life sciences companies started in the incubators program and many of them also received additional funding from various programs of the Israel Innovation Authority. Among them are: Re Walk, Compugen, Simbionix, Protalix, Prolor, Mazor Robotics, Enzymotec, Colllplant, Valtech, Dune Medical and others. Most of these companies are now public, either in Israel or in the US.

R&D centers of foreign industrial MNCs in the fields of Healthcare

Recently, the Israel Innovation Authority launched a new Incentive Track (No. 35) to encourage the establishment or expansion of R&D centers operated by foreign industrial Multinational Corporations (MNCs) in the fields of Biotechnology, Medical Devices or Digital Health. MNCs will be able to establish or expand operations in Israel, in the fields of R&D, technological innovation or manufacturing, by basing or transferring some of their global economic activity to Israel.

The most active life sciences incubators:

According to Medison Pharma® in late 2017 the Israel Innovation Authority announced its intention to launch a second biotechnology incubator in Israel’s northern region. The tender to run the incubator is already circulating with potential industry partners, and the Israel Innovation Authority plans for the new incubator to be operational during 2018.

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4 Based on publicly available information.
The following is a list, in alphabetic order, of incubators in Israel with a complete or partial focus on life science and healthcare project:

- Alon-MedTech Ventures Ltd: medical devices and digital health – established in 2013 and located in Yokneam Illit, Supported by the Israel Innovation Authority. The leading investor in the incubator is the renowned Israeli entrepreneur Dr. Shimon Eckhouse (founder of Lumenis and NASDAQ-traded Syneron).

  Alon-MedTech's portfolio includes 12 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.

- BioInc: therapeutics - established in 2012, located in Yavne, privately owned by M Ventures (Merck’s corporate venture arm).

  BioInc opened as a stand-alone laboratory facility of 500sqm, equipped with state-of-the-art Research & Development equipment, and is located inside the Interlabs facility in Yavne, the leading Merck R&D site in Israel. This proximity to Merck allows for a unique level of support and interaction between scientists.

  BioInc's is investing in companies after the pre-seed stage, and is currently housing Metabomed (A drug discovery company in the field of cancer metabolism) and ARTSaVIT (A cancer apoptosis company, developing ARTS mimetics).

- eHealth Ventures: digital health - established in 2016 and located in Modi'in Illit, Supported by the Israel Innovation Authority. Investors in the incubator include Medison Pharma (a leading Israeli commercial partner for international pharmaceuticals and an active investor in innovation), Maccabi Healthcare Services (Israel's 2nd largest HMO), Cleveland Clinic Innovations (commercialization arm for Cleveland Clinic - US top two Medical Center), Amgen (a global biopharmaceutical leader) and SCI (Shanghai Creation Investment, a major China-based VC and investment bank).
The incubator expects to take in 40 startups over its eight years of licensed operation and is currently recruiting companies in the field of digital health including: tele-medicine / tele-diagnostics, IT management and decision support systems for hospitals and clinics, big data and predictive analytics, IOT devices, apps for changing behavior, gaming systems for improving health and more. The incubator is constantly assessing new projects, and currently has six portfolio companies in various areas and development stages, including: AllerGuard (device for detecting allergens in food), OsteoSee (Bone Density Measurement as a screening and monitoring tool) and Mind's Eye (ADHD monitoring and diagnosis).

eHealth Ventures intends to raise more capital for follow-up investments in companies that will graduate from the incubator after two to three years.

- ExploreBio: healthcare and life science - launched in 2018, located in Yavne, privately owned. ExploreBio was established as a pre-seed investment vehicle by four investment funds targeted at early-stage companies in the biotechnology landscape in Israel: M Ventures, Arkin Bio Holdings, Pontifax and WuXi AppTec have partnered up in this endeavor.

ExploreBio committed $20M over the next five years, to be invested jointly in an initiative comprising pre-seed investments and management services for proof-of-concept-experiments in biotechnology. Explore Bio aims to invest $1 million to $1.5 million per company across up to four investments per year over a period of five years. The early-stage companies can benefit from quick access to funding and easy access to follow-up capital and possibility to work at the M Ventures BioIncubator facilities based in Yavne, Israel.

Two companies have been incorporated in 2018, Explore Bio 1 (a novel T-Cell engager platform) and Pantheon Bioscience (a novel platform of bacterial defense mechanism), both are housed in the M Ventures BioIncubator facilities.

- FutuRX biotech accelerator: biotechnology – established in 2014, located in Ness Ziona, Supported by the Israel Innovation Authority. 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 eleven early stage biopharma companies. Notable companies on the incubator’s portfolio are HepaRx (clinical stage, developing a proprietary small molecule cancer drug), XoNovo (preclinical-stage, developing a proprietary small molecule for the treatment of neurodegenerative diseases) and Mitoconix Bio Ltd. (developing a first-in-class inhibitor of mitochondrial division for treating Huntington’s disease and other neurodegenerative conditions).

In 2017 two FutureRx portfolio companies raised significant funding: in September 2017 Mitoconix Bio raised $20M in series A funding from multiple investors (current and new), while in May 2017 BiomX (developing microbiome-based therapeutics for various indications) raised $24M from new and existing investors. Additionally, RM Global launched in May 2017 RMGP Biopharma Fund, a $30M fund, to support promising companies emerging out of FutureRx.

- **Galil Ofek Technological Innovation**: biomedical technologies – launched in 2016, located in Katzrin, Supported by the Israel Innovation Authority, with specific focus on medical devices and biotechnology (internet and software as secondary fields of interest).

  The incubator is a partnership between Mikal (A holding and investment company), Next North (focused on technology and startups investment and BD), Paz Atid (holdings, projects and entrepreneurship in medical devices in the Galilee), Tav Medical (investing in technology startups and their BD) and Mor Research (the technology transfer company of Clalit Health Services).

  Galil Ofek’s portfolio currently includes 4 companies: Marpé Technologies (computer assisted skin cancer screening), Vicut Medical (device for removing polyps on internal organs), Biobetter (tech for protein manufacturing and purification of biologic drugs) and Epic MD (developing a new fascia closure device).

- **Incubit Technology Ventures**: innovative and unique technologies - established in 2014, located in Be’er Sheva, Supported by the Israel Innovation Authority. The incubator is fully owned and backed by Elbit Systems, the largest publicly traded Israeli high-tech defense company.

  Incubit’s portfolio includes eight companies, of which two 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: software and life science - established in 2012, located in Ariel University of Samaria, Supported by the Israel Innovation Authority. 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. 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 (expandable products and technologies for minimally invasive spine surgery) was acquired by US-based SeaSpine Holdings Corp. for $43 million (announced August 2016) and Valtech Cardio (transcatheter repair of the mitral and tricuspid valves) was acquired by US-based Edwards Lifesciences for $340 million (announced November 2016). In addition, Otic Pharma (device delivering foam for the treatment of ear disorders) announced its merger with NASDAQ shell Tokai Pharmaceuticals (December 2016).

In January 2018 Incentive’s portfolio company CartiHeal (developing a treatment for joint surface lesions) secured $2.5M from Bioventus, complementing CartiHeal's a financing round (led by aMoon, JJDC Inc., Peregrine Ventures, and Elron), bringing the total round to $21M.

• Lonza Collaborative Innovation Center (CIC): engineering, software and life science – established in 2017, located in Haifa, privately owned. CIC was scheduled to begin working in Q4 2017, and hire 15-20 staff members in 2018.

CIC’s goal is to leverage Israel's scientific strengths in areas such as engineering, software and cell/molecular biology to provide Lonza opportunities to gain additional know-how and capabilities. Lonza aims to accelerate leading Research & Development projects from across Lonza's Pharma & Biotech segment, as well as tap into potentially transformative biological and manufacturing capabilities.

The CIC will have a dedicated Lonza R&D team in Israel, who will work with local industry and academic experts through collaborations and sponsored research. Lonza has already signed memorandums of understanding and conducted talent scouting at Tel Aviv University, Technion R&D Foundation and the Weizmann Institute of Science.

• MEDX Xelerator: medical device and digital health - established in late-2016, located in Or Yehuda, Supported by the Israel Innovation Authority. 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, two companies have been added to its portfolio: CanaryCheck (early detection of postoperative anastomotic risk) and EndoWays (robotic, self-propelling micro catheter to navigate through tortuous blood vessels).

- **MindUp: digital health** - established in early 2016, located in Haifa, Supported by the Israel Innovation Authority. 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, genomics analysis and hospital IT systems.

  MindUp currently has five portfolio companies: Gait Better (reducing fall rate and improving mobility for seniors), Hemonitor (autonomous, continuous and non-invasive ultrasound-based system), Preceyese (non-contact home-tonometer), 4C Diagnostics LTD. (fully automated home-use stool sampling) and Resmetrix (novel respirator disease management system).

- **NGT3, Next Generation Technologies**: medical device and life science technologies – established in 2013, located in Nazareth, Supported by the Israel Innovation Authority. 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 11 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.

  NGT3 added two companies to its portfolio in 2017: EIO Biomedical (developing a unique solution for surgical adhesion preventions), and Barcode Diagnostics (developing a personal cancer drug screening).
• PMatX: next generation electronics – established in 2018, located in Yavne, Supported by the Israel Innovation Authority. The incubator is a partnership between M Ventures (Merck’s corporate venture arm), Flextronics International (multinational technological manufacturer), HP (US-based hardware and software company), and Battery Ventures (US-baes global investment firm).

PMATX is an open innovation lab that strives to lead the development of the Israeli ecosystem for next generation electronics, whereby integrating advanced materials with novel manufacturing methods. 400sqm local lab facilities dedicated for synthesis, analytics, printing and electronics next to the M Ventures BioIncubator in Yavne are combined with technical mentoring from both Flex and M Ventures.

The incubators focus covers next generation electronics, covering areas including: sensors flexible electronics, nanomaterials, organic electronics, new manufacturing technologies being developed for electronics including molded interconnect devices, in mold electronics, and functional additive manufacturing, new applications that will require electronics integrated into non-standard form factors including wearables, small devices, and others.

PMatX is expected to announce its portfolio companies in May 2018.

• RAD BioMed Accelerator: medical device, ophthalmology, biopharma and diagnostics –located in Tel Aviv, privately owned, established in 1992 by Mr. Yehuda Zisapel and Prof. Nava Zisapel (previously founders of Neurim Pharmaceutical).

RAD Biomed Accelerator was launched by the RAD Group, a world leader in voice and data communications technologies. The accelerator has 18 companies under its portfolio. 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 June 2017 Rad Biomed portfolio company Belkin Laser, developing an automatic one-second laser treatment for glaucoma, closed a $5 million financing round, with $2.5M raised from Singapore’s Zicom Holdings and from China’s Rimonci Capital. Additional €2.5M were secured via an EU grant as part of the GLAUrious Program.

• Sanara Ventures: medical technologies – established in early 2016, located in Ra’anana. Supported by the Israel Innovation Authority, the incubator is a joint venture of Teva Pharmaceutical Industries and Philips Healthcare.
Sanara’s portfolio includes 12 companies covering a range of medical technologies. Notable companies include eWay (a hand-held nebulizer for pulmonary drug administration), Myhomedoc (smartphone-based remote checkups and diagnosis), Purecare (innovative gum treatment), Lensfree (device lowering CT radiation), BRreatheme (spirometer and app-based asthma management), SpirCare (innovative lung residual capacity measurement).

- Terralab Ventures: broad technological focus – established in 2013, located in Yokneam Illit, supported by the Israel Innovation Authority. 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 five life science oriented companies: Sphinx (head lice treatment), Epitech (dry eye treatment), Kytera (contextual activity analysis home system for seniors), Neurolief (non-invasive brain neuromodulation technology) and Augmedics (augmented reality guided surgery), which raised in September 2017 $8.3M in series A funding led by AO Invest together with the Israel Innovation Authority, Terra ventures and other investors.

- Trendlines Medical (previously named Misgav Technology Center): medical technology – established in 1996, locations in Misgav Business Park and Ramat Gan, supported by the Israel Innovation Authority. 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 33 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).

In April of 2018 Trendlines announced that its portfolio company Stimatix (developing low-profile solutions for colostomy management) sold its assets to a subsidiary of the B. Braun Group, a German medical device company. Following the transaction Trendlines is left with 28.2% of Stimatix, which was valued at $42.6M.

- **Van Leer Xenia Incubator:** tech, digital health and life science – established in 2012, located in Jerusalem, supported by the Israel Innovation Authority. The incubator was formed following 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. Out of nine companies in its portfolio, six are in the medical, pharma and digital health spaces, including: EyeYon Medical (medical ophthalmic devices), Camereyes (high-quality retinal screening), Eximore (ophthalmic drug delivery), Ninox (device for the treatment of obstructive sleep apnea), Omnix Medical (novel antibiotic agents against resistant pathogenic bacterial strains) and TP Cera (developing an immunomodulatory compound for the treatment of autoimmune disease).

- **Youdim Pharmaceuticals Incubator:** drug development and diagnostics – established in 1997, located in Yokneam Illit. The incubator is wholly owned, and operates as integral part of Youdim Pharmaceuticals.

  Youdim’s portfolio includes four 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).
Acquisitions of Israeli Life Sciences companies

According to IVC Research Center, 124 Israeli life sciences companies have been acquired since 2008, for a total of $10 billion (Figures 32 and 33, and Table 2). In 2017, we have seen the largest acquisition of an Israeli life science company for $1.1 billion, which is, according to PwC Israel Exit Report 2017, the second largest deal made in Israel in 2017. Interesting to see that three out of the 10 largest hi-tech deals made in Israel in 2017 are of life sciences companies. This brings the total acquisition amount in 2017 to almost $2.1 billion, the highest since 2013. According to the PwC report, pharma and life science deals grew in 2017 in terms of both deal count and value. While 2017 marked a revival of technology-related investments, mainly medical devices and service, big pharma companies has not yet fully returned to the deal market.

In the same period, only $6.3 billion was invested in Israeli life sciences companies (as seen in Figure 12), but while in 2014-2016 the amount raised by Israeli life sciences companies was higher than the amount paid for acquisitions (in every individual year), in 2017 the amount paid for acquisitions was significantly higher than the amount raised by the companies, similar to situation in the first half of the decade.

Figure 32 - Acquisitions of Israeli Life Sciences Companies Subsectors - $ millions, # of Companies (2008-2017)
Figure 33 - Acquisitions of Israeli Life Sciences Companies by Subsector (# of companies 2013-2017)

Table 2 - Acquisitions of Israeli Life Sciences Companies with Values Exceeding $10 million (2012-2017)

<table>
<thead>
<tr>
<th>Company name</th>
<th>Deal Amount ($m)</th>
<th>Acquired By</th>
<th>Year</th>
<th>Sector</th>
</tr>
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<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>
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<td>2012</td>
<td>Medical device</td>
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<td>Surpass Medical Ltd.</td>
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<td>Stryker</td>
<td>2012</td>
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<td>Thrombotech Ltd.</td>
<td>56.5</td>
<td>D-Pharm</td>
<td>2012</td>
<td>Biotechnology</td>
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<td>Sync-Rx Ltd.</td>
<td>17.3</td>
<td>Volcano</td>
<td>2012</td>
<td>Medical device</td>
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<tr>
<td>UltraShape Medical Inc.</td>
<td>12</td>
<td>Syneron Candela</td>
<td>2012</td>
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<td>Given Imaging Ltd.</td>
<td>970</td>
<td>Covidien</td>
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<td>PROLOR Biotech Inc.</td>
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<td>OPKO Health</td>
<td>2013</td>
<td>Biotechnology</td>
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<td>dbMotion Ltd.</td>
<td>235</td>
<td>Allscripts</td>
<td>2013</td>
<td>Health IT</td>
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<td>Alma Lasers Ltd.</td>
<td>221</td>
<td>Fosun Pharma</td>
<td>2013</td>
<td>Medical device</td>
</tr>
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</table>

Source: IVC-Meitar High-Tech Exits Report
<table>
<thead>
<tr>
<th>Company name</th>
<th>Deal Amount ($m)</th>
<th>Acquired By</th>
<th>Year</th>
<th>Sector</th>
</tr>
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<td>Kimberly-Clark</td>
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<td>3D Systems</td>
<td>2014</td>
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<td>Newport</td>
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<td>MIS Implants Technologies Ltd.</td>
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<td>Dentsply Sirona</td>
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<td>BTG</td>
<td>2016</td>
<td>Medical device</td>
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<td>Magic Software</td>
<td>2016</td>
<td>Health IT</td>
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<td>ETView Ltd.</td>
<td>16</td>
<td>Ambu</td>
<td>2016</td>
<td>Medical device</td>
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<td>NeuroDerm Ltd.</td>
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<td>Mitsubishi Tanabe Pharma</td>
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<td>400</td>
<td>Apax Partners</td>
<td>2017</td>
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<td>Valtech Cardio Ltd.</td>
<td>340</td>
<td>Edwards Lifesciences</td>
<td>2017</td>
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<tr>
<td>Caesarea Medical Electronics (CME)</td>
<td>150</td>
<td>BD</td>
<td>2017</td>
<td>Medical device</td>
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<tr>
<td>IOPTima Ltd.</td>
<td>56</td>
<td>Chengdu Kanghong Pharmaceutical Group</td>
<td>2017</td>
<td>Medical device</td>
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<tr>
<td>GeneSort Ltd.</td>
<td>23</td>
<td>AID Partners</td>
<td>2017</td>
<td>Biotechnology</td>
</tr>
<tr>
<td>Talent Biotechs Ltd.</td>
<td>10</td>
<td>Kalytera</td>
<td>2017</td>
<td>Medical device</td>
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</tbody>
</table>
When it comes to global medtech industry consolidation, 2017 started with the purchase of St. Jude Medical by Abbott Laboratories for $25 billion and ended with the acquisition of C. R. by Becton Dickinson, for $24 billion, the third and fourth largest acquisitions the sector has ever seen (respectively). We would like to put attention to the Kite Pharma acquisition for more than $12 billion, the largest amount ever paid for a company that does not have an approved product. Although Kite Pharma is not considered an Israeli company, Israeli scientists founded it and its technology is heavily based on technology developed in the Weizmann Institute of Science. The total value of all M&A deals closed in 2017 was the second-highest annual total of the past five years - $98.5 billion in 2017, compared to $48.1 billion in 2016. On the other hand, the number of deals was the lowest since 2009 - 183 deals, compared to 239 deals in 2016 (Figure 34).

**Figure 34 - Global Medtech M&A Activity**

![Graph showing Medtech M&A transactions closed over the last 5 years](source: Pharma, Biotech & Medtech 2017 in review, February 2018)
According to Pharma, Biotech & Medtech 2017 In Review, published by Evaluate Pharma, Pharma/Biotech M&A acquisitions in 2017 totaled $80 billion. Only 179 deals were closed in 2017, and thus making 2017 the slowest M&A year of the past five years. The decrease in total M&A spend in 2017 was due to a lack of megamerger deals. Excluding the two largest deals of the year (Actelion and Kite Pharma), the total value of deals in 2017 was only approximately $1 billion dollars (Figure 35).

Figure 35 - Pharma and Biotech M&A Activity

Source: Pharma, Biotech & Medtech 2017 in review, February 2018

* This analysis only includes acquisitions by pharma and biotech companies - it excludes medtech and diagnostic players, for example.
Export of Israeli Life Sciences Products

According to the Israel Export and International Cooperation Institute (IEICI), pharmaceutical and medical equipment product exports from Israel in 2017 reached $9 billion, which is almost 9% of the total exports of goods and services from Israel, and 39% of the total industrial hi-tech exports. As seen in Figure 36 below, while industrial hi-tech exports rose by 1.2% in dollar terms, to $22.8 billion, pharmaceuticals exports increased by 9% reaching an all-time annual high by this industry. Exports of medical equipment increased by 7% to $1.5 billion, compared to $1.4 billion in 2016.

Exports to the US, Israel's biggest market, decreased by 2% in 2017 to a total of $11.3 billion, mainly due to decrease in pharmaceutical exports, which is a dominant industry in exports to the US (and overall in Israeli exports), but also highly volatile. On the other hand, exports of medical equipment continued to grow at an accelerated pace (for the fourth consecutive year) and rose by 10% to $910 million. Exports to the UK, Israel's second-ranking export market and the biggest in Europe, rose by 33% in 2017, achieving a record amount of $3.8 billion. Consistent with the past few years, most of the growth in 2017 is attributable to exports of pharmaceuticals, which accounts for approximately 74% of total exports to the UK. 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. We believe, as also noted in the IEICI report, that Teva's significant influence can result into a decrease in the pharmaceuticals exports in 2018.

Figure 36 - Industrial Hi-tech Exports from Israel

Source: Developments and Trends In Israeli Exports, The Israel Export and International Cooperation Institute, March 2018
We believe that the number of scientific publications is one of the metrics for academic excellence, since it demonstrates a link between basic research, applied research and industrial development. As seen in Figure 37 below, 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, the most published topic ⁵, by a considerable margin, both in 2017 and 2013 was Medicine, followed by Biochemistry. Interesting to see that the two leading sub-sectors in scientific publications in Israel are related to life sciences. Also interesting to see that while the total number of scientific publications in the Medicine sub-sector decreased worldwide, the percentage of Israeli publications has increased by 8%.

We can also see that although Israel’s population is only 0.1% of the world’s population, Israeli scientific publications are responsible for 0.21%-1.44% of publication worldwide (Figure 37).

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⁵ It is important to note that a specific publication can be relevant to more than one sub-sector, and as such the data for each sub-sector should be analyzed separately and the percentage shown in Figure 37 cannot be summed up.
Figure 37 - Percentage of Israeli Scientific Publications from Total Worldwide Publications

Source: Samuel Neaman Institute Analysis
Academic Students

According to a study performed by The Council for Higher Education regarding the pursuit of academic degrees in life sciences, in 2016/2017 the number of new students in the fields of nature and technology increased in universities and colleges and reached 17,240, a significant increase of about 6% compared to 2015/2016. This is the largest increase in the last ten years in these fields.

Students' demand for studies in the field of biotechnology is also affected by developments in the industry. By the middle of the first decade of 2000, the number of applicants to biotechnology had risen to about 2,600, compared to 1,000 in the early 1990s. In 2002/2003, the number of first-year students in the field of biotechnology reached approximately 2,800, however, since then there has been a moderate decline in the number of biotechnology students.

While only 30.8% of Bachelor's degree-level students majored in science and technology (Engineering and Architecture, Agriculture, Biology science, Physics science, Mathematics, Statistics and Computer Science), 16% of the students of the Master's degree-level majored in science and technology (Figure 38).

Figure 38 - Students Enrolled in Institutions of Higher Education, According to Degree and Area of Study (2016/2017)

Source: Planning & Budgeting Committee, Council for Higher Education
Master's 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. Both, the total number of master's degree graduates and the percentage of biology science graduates (11%) did not change significantly since 2010/2011 (Figure 39).

Figure 39 - Distribution of Master's degree Recipients in Israel, by Field of Study (2010/2011 – 2014/2015)

Source: Illustration of The Samuel Neaman Institute at the Technion to data received from the Central Bureau of Statistics
Commercialization Companies in Israel - Technology Transfer Offices (TTOs)

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.

On August 2017, the Central Bureau of Statistics of the State of Israel published a survey regarding commercialization companies in Israel and their activities in 2016 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.

According to the survey, out of that number, commercialization companies filed 635 patent applications in 2016. According to the same survey, commercialization companies were also involved in setting up 34 startup companies.

According to Israel Patent Office’s report, 6,425 patent applications were filed in 2016, compared to 6,904 patents in 2015, a decrease of 7%. The dominant fields of new patent applications were human necessities (43%), chemistry and metallurgy (27%) and physics (12%). Despite of the decrease in the total number of applications, there has been a significant increase of 17% in the human necessities field (Figure 40).
Connecting Israel’s tech ecosystem

Supporting Israeli Tech Transfer Offices

Over the past 10-15 years, a number of funding and business development vehicles have emerged with the goal of interfacing directly with Israeli TTOs and researchers. These vehicles deploy diverse models as it pertains to institutional affiliation, projects sourcing, research areas and funding support. Still, these vehicles are unified by their mission goal to offer early projects a secure runway for commercialization by facilitating access to funding and commercialization and industry knowhow, out of the belief that all too often innovative research projects fail to reach the market despite having a commercial potential.

- Alfred Mann Institute – Technion (AMIT): established in 2006 by Dr. Alfred E. Mann, an American entrepreneur and philanthropist, and by the Technion - Israel Institute of Technology, AMIT aspires to bridge the gap between applied academic research and commercial success. AMIT is the Technion’s acceleration hub, supporting the development and commercialization of exceptional biomedical innovations conceived by Technion students, faculty and alumni, with a mission to bring to market promising innovative biomedical technologies.

AMIT runs the Grassroots program to help translate state-of-the-art biomedical innovations into successful companies that can help mankind. This program is a joint partnership between the Technion and the Alfred Mann Foundation (a US-based organization with a track record of commercializing biomedical innovation). As part of the Grassroots program, AMIT works with physicians from medical institutes worldwide, in search of unmet medical needs and ideas with the potential to significantly impact healthcare. Upon selection, AMIT establishes a company and leads development across the full spectrum of biomedical requirements. AMIT currently has 13 companies in its portfolio.
• **Hadasit Bio-Holdings LTD. - The Hadassah University Medical Center:** Hadasit Bio-Holdings (HBL), founded in 2005, is a public company (TASE: HDST) focusing on a variety of therapeutic areas. HBL's pipeline is made solely of pipeline of projects emerging from Hadasit (Hadassah University Medical Center TTO). HBL companies operate in the fields of Oncology (Rx and Dx), Regenerative Medicine and Inflammatory Disease.

HBL focuses on completion of Phase I and preparation for Phase II for its portfolio companies. Key inclusion criteria for selection of the Hadassah based companies into HBL include companies with an established proof of concept via animal model testing, which address a multi-billion dollar market with unmet clinical needs. HBL currently has six companies in its portfolio.

• **Integra Holdings - Hebrew University:** founded in 2012 by Yissum (the Hebrew University TTO), Integra invests in projects coming out the Hebrew University, and it holds an exclusive right to first examine the most promising innovations and IP emerging from the institution. Integra focuses on biopharmaceuticals and medical diagnostics and devices.

Integra employs multidisciplinary teams of experts who work alongside inventors and take a hands-on approach to achieving commercial success. The fund provides know-how and support to its portfolio companies from inception to commercialization, while leveraging its extensive industry network cultivated over decades.

Integra Holdings holds a diversified portfolio of eleven companies in early to late stages, with established partnerships with leading investment funds such as Orbimed, Pontifax, Lundbeck fund, SROne, CBI and Biolight LifeSciences, as well as private investors.

• **LinkEdge (multiple institutions):** Established in 2017, LinkEdge invests seed capital in genuine life sciences innovation from Israeli universities, research institutions and medical centers, with a strong emphasis on drug development, medical devices, and digital health. LinkEdge uses its expertise to navigate early ventures closer to their goals. The platform was established by two synergetic players: Medison Pharma, a leading Israeli commercial partner for international pharmaceuticals and an active investor in innovation, and Zavit Ventures, an active investor in Israeli biotech and next-generation technologies.
LinkEdge’s strategy is to capitalize on the funding gap characterizing early stage life science innovations, which often have exhausted the resources available to them but have not created sufficient value to secure significant financing from investors. Thus, LinkEdge’s goal is to work closely with institutions that foster innovation, seeking projects in the ideation stage or in initial development that are underlined by evolutionary or revolutionary innovative premises.

LinkEdge launched with a unique partnership with Shaare Zedek Medical Center where it has already selected six projects for initial funding. Concomitantly, LinkEdge is also evaluating projects from other Israeli universities, hospitals and research institutions, where the venture is seeking to build long-term relationships that will allow it to identify more innovative research with commercial potential.

• Momentum - Tel Aviv University: established in 2014 following an investment from the Tata Group and from the Singapore-based Temaske, the Momentum Fund invests in promising breakthrough technologies in a wide range of fields emerging from Tel Aviv University researchers, including pharmaceuticals, healthcare, high-tech and the physical sciences.

Momentum Fund investment recipients are early stage innovative projects that can receive $250 thousands to $1 million to further their research, with an eye towards rapid commercialization. Tel Aviv University researchers involved in funded projects receive assistance from both the Momentum Fund and Ramot (Tel Aviv University TTO) in forging connections with industry, as well as guidance in all aspects involved in transforming projects into products.

• Startup Nation 2 Enterprise (multiple institutions): Startup Nation 2 Enterprise (SN2E) was founded in 2014, with the goal of becoming a leading IP and know-how marketplace for Israeli innovations in a wide range of scientific fields. SN2E received authorization from the Israeli Council for Higher Education to aggregate and commercialize IP developed at Israeli government-funded academic institutions, hospitals and research centers. As such, SN2E is eligible to receive equity-free government subsidies to accelerate IP development in the research institutions it represents.

SN2E has dozens of IPs ready for industry growth applications as well as access to IPs in the development pipeline, and to researchers from leading Israeli institutes. SN2E aims to connect Israel’s leading researchers with multi-national Fortune 1,000 companies, M&A and Ventures Executives by facilitating an end-to-end customer-centric IP commercialization process.
SN2E is currently affiliated with a number of Israeli institutions, only some of which are with life-science orientation: AFEKA (Tel Aviv Academic College of Engineering), Bezalel Academy of Arts and Design, Galilee Medical Center, Hadassah Academic College, Jerusalem College of Technology, ORT Braude College, Ruppin Academic Center, Shenkar and Tel-Hai Academic College.

- The National Institute for Biotechnology in the Negev - Ben Gurion University (NIBN): Established in 2009 as an independent research body and functions under the auspices of Ben Gurion University (BGU) as a separate and distinct Institute. The NIBN's mission is to plant the seeds that will lead to the growth of successful biotechnology industries in Israel, particularly in the Negev. The institution is steered by its own Advisory Committee in which the Israeli Government, major donors and BGU have equal representation. The NIBN practices a multidisciplinary approach, relatively free of departmental gating.

Most of NIBN scientists are recruited after completion of the post-doctoral studies abroad. Scientists admitted to NIBN are provided with sufficient lab space and a generous start-up package to cover all of their needs, and are expected to generate research of commercial value. Membership in the Institute is subject to scientific re-evaluation every three to five years to ensure that the research focus of all current members remains in line with the goals of the Institute.

Research at the NIBN is organized into six core areas: oncology, genetic disorders, infectious diseases, autoimmune and metabolic diseases, neurodegenerative diseases and applied biotechnology.
Table 3 - Most active Tech Transfer Offices in Israel, by institutions:

<table>
<thead>
<tr>
<th>Institution Type</th>
<th>Institution Name</th>
<th>Tech Transfer Office</th>
</tr>
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<td>Universities</td>
<td>Ariel University</td>
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<td>B.G. Negev Technologies &amp; Applications Ltd.</td>
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<td>A.Y.Y.T</td>
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<td></td>
<td>ORT Braude College</td>
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<td>Organizations</td>
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Global Trends

PwC’s “2017 Pharmaceuticals and Life Sciences Industry Trends” report identifies, amongst other topics, the following major developments, which we believe are still relevant for the coming year:

“Patient first”: Firms are moving towards a flexible and interactive approach that provides patients with better tools and information about the drugs they are consuming and their medical conditions. Due to advances in digital and medical technology, pharma companies and healthcare providers can access patient data seamlessly, in real time. A variety of tools can be combined with online portals and mobile apps to enhance better and more immediate communication with patients. These apps can be used to track the progression of a disease or recovery and help healthcare companies better understand patient needs.

This patient-first business model helps establish pharma companies as valued partners of consumers. In turn, pharma companies that succeed in patient engagement efforts increase their chances of regulatory and commercial success since decisions about approval, prescribing, and marketing of drugs are more closely tied to patient results and needs. The insights that drugmakers provide to patients reduce potentially dangerous errors related to taking the drug and minimize the time that patients have to spend managing their disease and navigating the healthcare system.

- Analytics: The pharma industry is at the early stages of a fundamental shift to analytics and advanced data sciences. This is expected to enhance business decision making at all levels. For the last decades, the volume and variety of medical information has expanded significantly. Pharma companies have begun to realize real benefits from this evolving data ecosystem, using new methods for rapid acquisition, curation, analysis, and visualization of large, diverse data sets in cloud-based storage and distributed computing power platforms. Implemented correctly, enterprise analytics programs can offer the many benefits for individual functions in a pharma company.

6 https://www.strategyand.pwc.com/trend/2017-life-sciences-trends
According to PwC's report “Top health industry issues of 2018”\(^7\), 2018 likely will be distinguished by persistent uncertainty and risk for the industry, but these challenges also may motivate health organizations to seek out greater cross-sector collaboration, make new strategic investments and create efficiencies, all tactics that shore up enterprise resilience. These are some of the key challenges the health industry faces in 2018:

- **Securing the internet of things:** Internet-connected medical devices are being utilized in hospitals and life sciences companies for various tasks, such as patient care, medical records and billing. In the healthcare industry, new cybersecurity threats, such as ransomware, are targeting both payers and providers, as well as therapeutics, such as medical devices. In 2017, cybersecurity breaches in the medical device industry have increased by 525\% in the US and in 2016, 16 hospitals in the UK were unable to access internet-connected devices. Hospitals and health organizations should prepare with robust defenses and remediation plans in order to maintain data privacy, secure connected medical devices and protect patients.

- **Artificial Intelligence:** While adoption of artificial intelligence technology may seem slow in life sciences compared to other industries, AI is gaining momentum and has the potential to significantly change the industry. Health businesses are using AI to automate decision-making, create financial and tax reporting efficiencies, automate parts of their supply chains, or streamline regulatory compliance functions. Healthcare providers can leverage AI tools to help their staff analyze routine pathology or radiology results more quickly and accurately, allowing them to see more patients and realize greater revenues.

- **Tax reform in the US:** Tax legislation passed by the House Republicans proposed reducing the federal corporate tax rate from 35\% to 20\% and a shift to a territorial system. These changes will require new strategies from health organizations in 2018, and may demand rethinking of business models and supply chains.

While some of the challenges are driven by laws and regulations, other are driven by technological changes. Israel's innovation and leading position in some of those areas - cybersecurity as one example - is a great advantage to the Israeli life sciences companies, and will allow them to take a leading role in overcoming these challenges.

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Acted as counsel to V-Wave Ltd.
April 2018

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DarioHealth Corp
$7 Million Private Placement of Common Stock, Preferred Stock and Warrants
Acted as issuer’s counsel for DarioHealth Corp
February 2018

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$40 Million Equity Investment
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