Life Sciences in Catalonia
May 2019
Sector Report
Life sciences in Catalonia: Sector Report

ACCIÓ
Government of Catalonia

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Author
ACCIÓ Strategy and Competitive Intelligence Unit

Collaboration
Biocat

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1. Executive summary
The Catalan life sciences industry: Key data

The life sciences industry in Catalonia is robust and a hot spot for business & innovation.

1,060 COMPANIES (2017)
280 biotech companies
180 professional services and consulting companies
176 medtech companies
139 providers and distributors
128 digital health companies
125 pharma companies
32 investing organizations

The company creation rate is about 1 new company per week.

17,802 M€ TURNOVER (2016)
3.4% of Catalan GDP.
Pharma companies represent 47% of total turnover.

Turnover is €31,087 M (7.2% of Catalan GDP) when healthcare services companies are included

53,731 EMPLOYEES (2016)
Pharma companies concentrate 37% of people employed by the sector.

223,731 people are employed by the sector when healthcare services companies are included (7% of the working population in Catalonia).

89 research institutions: research centres, university hospitals, large research infrastructures, technology centres and science and technology parks with life sciences and health activities.

Source: EIC (DGI – ACCIÓ) based on Scaling-up the BioRegion of Catalonia (2017) by Biocat
The Catalan life sciences industry snapshot (II)

- **World-class R&D hub**
  - 1.47% of Catalan GDP dedicated to R&D.
  - Catalonia concentrates the 23.3% of Spain’s total R&D expenditure.
  - 40 life sciences research centres with a wide range of specialties.
  - Despite representing only 1.2% of the ERA* population, Catalonia has already attracted 4.6% of H2020 FET Flagship funds5.

- **Exporting is part of everyday life science industry**
  - Catalan life sciences exports represent the 45.1% of the Spanish total.
  - Catalan life sciences exports represent the 7.9% over total Catalan exports.
  - Pharma Catalan exports represent 77.3% over total life sciences exports.
  - Switzerland, Germany, USA and France are the main commercial partners.

- **On the global radar for foreign investment**
  - Catalonia is considered the best South European region for investment in 2018 and 2019. (Financial times, 2018)
  - 37.5% of the FDI projects received in Spain.
  - 42.6% of the capital investment in Spain.
  - 44.5% of the jobs created in Spain.

ERA: European Research Area
Source: INE, Biocat. ICEX 2018 (data for 2018 is provisional). fDi Markets 2014 – 2018
Technological opportunities

12 ground-breaking technologies are identified as the main drivers of evolution and disruption. Health is the sector in which more of these technologies are expected to drive to dramatic changes:

- Artificial intelligence
- VR & AR
- Internet of Things
- Blockchain
- Robotics
- 3D printing
- Nanotech
- Quantic science

4 of these 12 technologies are life sciences specific:

- Biotechnology
- Genomics
- Neurosciences
- Pharmagenetics

The Catalan life sciences and biology ecosystem is composed of some of the strongest and most innovative companies and research institutions. Having the densest pharma ecosystem of Europe, the biggest biotech industry in Spain and a high technological and fast-growing medical devices sector, Catalonia offers the most complete life sciences business ecosystem in Southern Europe. Catalonia has as well over 40 leading scientific, technical & research centres which are strategic for the development of life sciences industries. Innovation is also one of the main characteristics of the Catalan life sciences industry, with more than 118 active spin-offs and 164 startups, together with the creation of more than 144 companies related with life sciences sector between 2015 and 2017. In addition, Neurosciences, genomics & epigenetics are classified as top Catalan bioregion capabilities by Biocat, the strategic Catalan life sciences agent and catalyst.

Source: Technological tendencies map, 2017. Scaling-up the BioRegion of Catalonia (2017) by Biocat and Barcelona Startup Hub, 2018
Investment opportunities (I)

Value chain

R&D centres

The powerful Catalan life sciences R&D ecosystem is made up of top tech & scientific centres, universities, university hospitals and a dense life sciences company ecosystem. Catalonia is a top R&D FDI destination, being the 5th region in total R&D FDI in Europe and 4th in pharmaceutical preparations.

Clinical trials

Spain is the 2nd country in Europe in number of clinical trials, and 78% of the state’s trials involve at least one centre in Catalonia. In 2015 we had more than 2,740 sites participating in clinical trials, featuring 2,000 expert researchers and more than 13,400 patients recruited.

Pharma production

Top global Pharma companies have installed their productive centres in Catalonia, creating Europe’s densest pharma ecosystem. Specifically, the fine chemical subsector concentrates 75% of Spanish production here, making Catalonia home to the world’s subsector leaders.

Logistics centers

Catalonia has a strong logistics ecosystem, specialized in pharmaceutics, healthcare, APIs, etc., in line with all current legislation. Major multinational companies (Sanofi, Synthon, Braun, Moehs or Grifols) operate internationally from Catalonia, and other companies (Roche Diagnostics or Disalfarm) have established logistics centres in the region to operate on a national and southern Europe level. Catalonia also has first class infrastructures: roads, port and airport with specialized pharmaceutic facilities.

Source: EIC (DGI – ACCIÓ)
Investment opportunities (II)

Trends and sector opportunities

**Digital health**
Catalonia is the perfect place to either develop or implement Digital health applications. The large and innovative startup ecosystem, part of the Catalan top R&D and tech hub (considered 5th of Europe), together with the early adopter Catalan society, makes our region the perfect place for digital health.

**Medtech**
Catalonia has a fast-growing medtech ecosystem, considered the 4th densest in Europe, and concentrating 42% of Spanish medtech companies. Composed mainly (61%) of R&D companies, the medtech Catalan ecosystem has received FDI from the top sector’s global companies.

**Silver economy**
An aging population and a strong silver economy ecosystem makes Catalonia the perfect place for these companies. More than 500 companies perform silver activities in Catalonia, which have a dedicated turnover of up to 9,000€M. Pharma and healthy food are the main silver economy subsectors in Catalonia.

**Big data**
Catalonia is at the forefront of big data in Europe. The presence of top multinational companies, a strong startup ecosystem and the leading Big Data conference makes Catalonia the most competitive location for Big data hubs, such as those established by Nestlé or Roche. Spain has been a pioneer in the inclusion of information technologies in the life sciences industry, such as the electronic health records system and digital prescription. Big data research projects on diseases as diabetes and Parkinson have been carried out in the BSC and CRG, and published in important journals.

**Oncology**
Defined as a top research area for the Catalan bioregion, oncology concentrates 36% of the total biomedical investment in innovation in Catalonia. Its leading research centres and personalities focus 35% of all Catalan medical trials in the oncology field. Catalan innovation and R&D is conducted by its world-renowned oncology leaders, as well as the top-notch Catalan university hospitals and research centres. For example, IRB has recently discovered a new colon cancer treatment.

Source: EIC (DGI – ACCIÓ)
International market opportunities

Source: Global trade mapping, 2019 by EIC (DGI – ACCIÓ)
2. Global sector overview
Life sciences

Global sector overview
Life sciences industry definition

Life sciences industry can be defined as the **combination of 4 main subsectors**

**Pharmaceutical**

**Pharmaceuticals** are commercial enterprises that research, develop, produce and sell drugs and other medicines. These enterprises are typically large and deal both in branded and generic compounds.

**Biotechnology**

**Biotechnology** companies are those that employ living organisms or biological substances for the development of products and services with applications in numerous fields such as waste management, food processing, agriculture and pharmaceutics.

**Medical Devices**

**Medical devices** companies, also known as *medtech*, are involved in research, development, production and marketing of systems and technologies for medical applications in humans and animals.

**Digital health**

**Digital health** refers to tools and services using information and communication technologies (ICTs) that can improve prevention, diagnosis, treatment, monitoring and management. It includes information and data sharing between patients and health service providers, hospitals, health professionals and health information networks.

Source: KPMG & European Commission
Value chain of the life sciences industry

There are as many types of value chains as life sciences subsectors and companies, but we have identified the main common parts of their value chain.

Source: Crowe Horwath and PwC
Life sciences

Global sector overview
Main life sciences companies in the world

The pharmaceutical companies fill the top 10 life sciences ranking, occupying the first 9 places.

<table>
<thead>
<tr>
<th>Company</th>
<th>Country of origin</th>
<th>Subsector</th>
<th>Presence in Catalonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johnson &amp; Johnson</td>
<td>US</td>
<td>Pharmaceuticals</td>
<td>Yes</td>
</tr>
<tr>
<td>Pfizer</td>
<td>US</td>
<td>Pharmaceuticals</td>
<td>Yes</td>
</tr>
<tr>
<td>Roche</td>
<td>SW</td>
<td>Pharmaceuticals</td>
<td>Yes</td>
</tr>
<tr>
<td>Novartis</td>
<td>SW</td>
<td>Pharmaceuticals</td>
<td>Yes</td>
</tr>
<tr>
<td>Bayer</td>
<td>DE</td>
<td>Pharmaceuticals</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Company</th>
<th>Country of origin</th>
<th>Subsector</th>
<th>Presence in Catalonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>SANOFI</td>
<td>FR</td>
<td>Pharmaceuticals</td>
<td>Yes</td>
</tr>
<tr>
<td>MERCK</td>
<td>US</td>
<td>Pharmaceuticals</td>
<td>Yes</td>
</tr>
<tr>
<td>Novartis</td>
<td>CH</td>
<td>Pharmaceuticals</td>
<td>No</td>
</tr>
<tr>
<td>gsk</td>
<td>GB</td>
<td>Pharmaceuticals</td>
<td>No</td>
</tr>
<tr>
<td>FRESENIUS KABI</td>
<td>DE</td>
<td>Medical Devices</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: EIC (DGI – ACCIÓ) based on Orbis. Companies sorted by turnover.
Pharmaceutical industry in the world

Pharmaceuticals

Although pharmaceutical turnover has decreased in 2015, it is expected to grow a 4.4% annually until 2020. New innovative drugs and the industry concentration (Top 10 pharma companies accounted for the 35% of the whole subsector turnover in 2016) are expected to be the drivers of pharmaceuticals growth.

Worldwide pharmaceutical subsector turnover

Source: Deloitte, 2017 global life sciences outlook. EIC (DGI – ACCIÓ) based on Orbis Companies sorted by turnover.

<table>
<thead>
<tr>
<th>Company</th>
<th>Country of origin</th>
<th>Presence in Catalonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Johnson&amp;Johnson</td>
<td>US</td>
<td>Yes</td>
</tr>
<tr>
<td>Pfizer</td>
<td>US</td>
<td>Yes</td>
</tr>
<tr>
<td>Roche</td>
<td>SW</td>
<td>Yes</td>
</tr>
<tr>
<td>Novartis</td>
<td>SW</td>
<td>Yes</td>
</tr>
<tr>
<td>GlaxoSmithKline</td>
<td>GB</td>
<td>No</td>
</tr>
<tr>
<td>Sanofi</td>
<td>FR</td>
<td>Yes</td>
</tr>
<tr>
<td>Merck</td>
<td>US</td>
<td>Yes</td>
</tr>
<tr>
<td>Gilead</td>
<td>US</td>
<td>Yes</td>
</tr>
<tr>
<td>Novo Nordisk</td>
<td>DK</td>
<td>No</td>
</tr>
</tbody>
</table>

Source: Deloitte, 2017 global life sciences outlook. EIC (DGI – ACCIÓ) based on Orbis Companies sorted by turnover.
Medical devices industry in the world

Medical devices

After the stagnant growth of the 2011-2015 period, still suffering the recession initiated in 2008, medical devices are expected to grow strongly at a pace of 5.3% annually. IoT, minimally invasive devices and governmental expansionary policies are expected to be the trigger of this stable growth.

Worldwide medical devices subsector turnover

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Official data</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>450</td>
<td>500</td>
<td>550</td>
<td>600</td>
<td>650</td>
<td>700</td>
<td>750</td>
</tr>
<tr>
<td>Forseen data</td>
<td>300</td>
<td>350</td>
<td>400</td>
<td>450</td>
<td>500</td>
<td>550</td>
<td>600</td>
<td>650</td>
<td>700</td>
<td>750</td>
</tr>
</tbody>
</table>

Source: Deloitte, 2017 global life sciences outlook. EIC (DGI – ACCIÓ) based on Orbis Companies sorted by turnover.

Top 10 medical devices companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Country of origin</th>
<th>Presence in Catalonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medtronic Biologics</td>
<td>US</td>
<td>Yes</td>
</tr>
<tr>
<td>Johnson &amp; Johnson</td>
<td>US</td>
<td>Yes</td>
</tr>
<tr>
<td>Siemens</td>
<td>DE</td>
<td>Yes</td>
</tr>
<tr>
<td>Philips</td>
<td>NL</td>
<td>Yes</td>
</tr>
<tr>
<td>Roche</td>
<td>SW</td>
<td>Yes</td>
</tr>
<tr>
<td>BD</td>
<td>US</td>
<td>No</td>
</tr>
<tr>
<td>Stryker</td>
<td>US</td>
<td>Yes</td>
</tr>
<tr>
<td>Abbott</td>
<td>US</td>
<td>Yes</td>
</tr>
<tr>
<td>Boston Scientific</td>
<td>US</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: EIC (DGI – ACCIÓ) based on Orbis.
Biotechnology industry in the world

Biotechnology

The slow but constant growth of biotech companies (1.62% CAGR from 2010) will continue due to: (I) the greater global investment in technology, (II) the ageing population and (III) the personalization of cures in segments like oncology, diabetes, AIDS/HIV, Alzheimer, etc.

Worldwide biotechnology subsector turnover


Top 10 biotech companies

<table>
<thead>
<tr>
<th>Company</th>
<th>Country of origin</th>
<th>Presence in Catalonia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quintiles</td>
<td>US</td>
<td>No</td>
</tr>
<tr>
<td>Bilfinger Berger</td>
<td>DE</td>
<td>No</td>
</tr>
<tr>
<td>Battelle</td>
<td>US</td>
<td>No</td>
</tr>
<tr>
<td>PPD</td>
<td>US</td>
<td>No</td>
</tr>
<tr>
<td>Eurofins</td>
<td>LU</td>
<td>No</td>
</tr>
<tr>
<td>Covance</td>
<td>US</td>
<td>No</td>
</tr>
<tr>
<td>Parexel</td>
<td>US</td>
<td>No</td>
</tr>
<tr>
<td>China Guodian</td>
<td>HK</td>
<td>No</td>
</tr>
<tr>
<td>PRA Health Sciences</td>
<td>US</td>
<td>Yes</td>
</tr>
<tr>
<td>Charles River</td>
<td>US</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Digital health industry in the world

Digital health

A dramatic increase in this subsector’s turnover is expected. New technological infrastructures as 5G, and therefore IoT, will boost the use of telemedicine and mobile health to comply with the demand of a more consumer oriented health services. Digital health venture funding reached $4 Billion in 2014.

**Worldwide digital health subsector turnover**

- **mHealth**
  - Mobile health applies the power and reach of mobile communication to health care services. It plays a key role in transforming health care into a more-efficient, patient-centered system of care in which individuals have real-time access to information to support engagement.

- **Telehealth**
  - For patients with congestive heart failure, diabetes, depression, and other chronic conditions, telehealth technologies such as home telemonitoring can reduce hospital readmissions and increase the ability of individuals to live independently.

- **Social media**
  - Pharma companies are trying to leverage data from online patient community platforms about drug side effects and patient interactions, turning it into insights to help solve the unmet needs of patient communities.

- **Wearables**
  - Many health-related wearable innovations leverage the power of biosensors, which can be placed in a watch, a patch on the skin, implanted under the skin, or swallowed like a pill. This digital health trend, venture capital funding for bio-sensing wearables increased a 500% from 2011 to 2013, reaching $282 million in 2013.

Source: Deloitte, 2017 & 2016 global life sciences outlook
Life sciences foreign trade in the world

The world’s imports on life sciences have increased in a 6.04% CAGR between 2012 and 2016, reaching 649,520,401€ in 2016. The top 10 sector’s importers are displayed in the following graph:

- USA, 119,653
- Germany, 56,767
- Belgium, 39,547
- France, 28,489
- Italy, 23,942
- Switzerland, 26,085
- Netherlands, 24,758
- Japan, 31,732
- UK, 35,895
- China, 30,685

Annualized imports growth:
- 0-5%
- 5-10%
- >10%

Imports

The world’s exports on life sciences have increased in a 5.66% CAGR between 2012 and 2016, reaching 613,842,226€ in 2016. The top 5 sector’s exporters are displayed in the following graph:

- USA, 79,771
- UK, 33,676
- Ireland, 38,700
- France, 33,494
- Belgium, 47,799
- Germany, 90,342
- Switzerland, 69,939
- Netherlands, 30,761
- China, 16,196

Annualized exports growth:
- 0-3%
- 3-6%
- >6%

Exports

Source: Trademap, 2017
Main countries investing in the global life sciences industry

Main countries of origin

<table>
<thead>
<tr>
<th>Country</th>
<th>Nº of projects 2014-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>734</td>
</tr>
<tr>
<td>Germany</td>
<td>274</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>186</td>
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<tr>
<td>Japan</td>
<td>184</td>
</tr>
<tr>
<td>Switzerland</td>
<td>151</td>
</tr>
<tr>
<td>France</td>
<td>121</td>
</tr>
<tr>
<td>China</td>
<td>102</td>
</tr>
<tr>
<td>India</td>
<td>80</td>
</tr>
<tr>
<td>Canada</td>
<td>66</td>
</tr>
<tr>
<td>Ireland</td>
<td>63</td>
</tr>
<tr>
<td>Other</td>
<td>617</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,578</strong></td>
</tr>
</tbody>
</table>

Number of FDI projects by year and source country

- **2018**
  - United States: 146
  - Germany: 68
  - United Kingdom: 42
  - Japan: 34
  - Switzerland: 33
  - Other: 239

- **2017**
  - United States: 145
  - Germany: 55
  - United Kingdom: 46
  - Japan: 42
  - Switzerland: 34
  - Other: 227

- **2016**
  - United States: 162
  - Germany: 60
  - United Kingdom: 28
  - Japan: 34
  - Switzerland: 32
  - Other: 191

- **2015**
  - United States: 127
  - Germany: 41
  - United Kingdom: 47
  - Japan: 26
  - Switzerland: 34
  - Other: 222

- **2014**
  - United States: 154
  - Germany: 50
  - United Kingdom: 31
  - Japan: 40
  - Switzerland: 18
  - Other: 170

Main countries of destination

<table>
<thead>
<tr>
<th>Country</th>
<th>Nº of projects 2014-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>447</td>
</tr>
<tr>
<td>Germany</td>
<td>237</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>205</td>
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<tr>
<td>China</td>
<td>177</td>
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<tr>
<td>France</td>
<td>111</td>
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<tr>
<td>Ireland</td>
<td>102</td>
</tr>
<tr>
<td>India</td>
<td>84</td>
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<tr>
<td>Singapore</td>
<td>69</td>
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<tr>
<td>Spain</td>
<td>64</td>
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<tr>
<td>Belgium</td>
<td>53</td>
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<tr>
<td>Other</td>
<td>1,029</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2,578</strong></td>
</tr>
</tbody>
</table>

Number of FDI projects by year and destination country

- **2018**
  - United States: 100
  - Germany: 28
  - United Kingdom: 45
  - Japan: 39
  - Switzerland: 30
  - Other: 320

- **2017**
  - United States: 105
  - Germany: 49
  - United Kingdom: 53
  - Japan: 38
  - Switzerland: 29
  - Other: 275

- **2016**
  - United States: 96
  - Germany: 66
  - United Kingdom: 40
  - Japan: 27
  - Switzerland: 15
  - Other: 263

- **2015**
  - United States: 81
  - Germany: 54
  - United Kingdom: 39
  - Japan: 37
  - Switzerland: 19
  - Other: 267

- **2014**
  - United States: 65
  - Germany: 40
  - United Kingdom: 28
  - Japan: 36
  - Switzerland: 18
  - Other: 276

Source: fDi Markets, 2014 – 2018
Life sciences

Global sector overview
Pharmaceutical industry in Europe (I)

Pharmaceutical industry has been increasing its potential in Europe during this decade, mainly driven by the R+D spending of big pharma companies and its increases in production.

The European Union has a positive trade balance of 96,291 in pharmaceuticals. Exports and imports (2015 data) are distributed as it is show in the graphs below:

Source: The Pharmaceutical Industry in Figures, 2017, European Federation of Pharmaceutical Industries and Associations
Pharmaceutical industry in Europe (II)

Germany, Switzerland and France are the countries with the higher level of turnover, employees and R+D spending, with UK and Italy always close enough.

**Top European countries in Pharmaceutical turnover**

1. Germany  
2. France  
3. UK  
4. Italy  
5. Spain  
6. Russia  
7. Turkey  
8. Poland  
9. Switzerland  
10. Netherlands

**Top European countries in Pharmaceutical R+D spending**

1. Switzerland  
2. Germany  
3. UK  
4. Belgium  
5. Denmark  
6. Italy  
7. Sweden  
8. Spain  
9. Netherlands  
10. Poland

**Top European countries in Pharmaceutical employment**

1. Germany  
2. France  
3. Italy  
4. UK  
5. Switzerland  
6. Spain  
7. Sweden  
8. Belgium  
9. Poland  
10. Denmark

Source: The Pharmaceutical Industry in Figures, 2017, European Federation of Pharmaceutical Industries and Associations
Medical devices industry in Europe

Turnover

The European medical devices market was estimated to be worth 110€B in 2015. The European market is considered the second in the world, accounting for the 29% of total industry’s value, below USA (42%).

The countries in Europe with the highest turnover in the medical devices subsector are Germany, France, United Kingdom, Italy and Spain.

![Pie chart showing the distribution of turnover by country in Europe]

Companies & employment

There are approximately 26,000 medical technology companies in Europe, being mainly distributed among Germany, UK, Italy, Switzerland, Spain and France. All these companies employ approximately more than 650,000 people in Europe.

<table>
<thead>
<tr>
<th>Country</th>
<th>Employment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>195,000</td>
</tr>
<tr>
<td>France</td>
<td>90,000</td>
</tr>
<tr>
<td>UK</td>
<td>71,000</td>
</tr>
<tr>
<td>Italy</td>
<td>68,000</td>
</tr>
<tr>
<td>Switzerland</td>
<td>54,000</td>
</tr>
<tr>
<td>Spain</td>
<td>23,000</td>
</tr>
<tr>
<td>Others</td>
<td>140,000</td>
</tr>
<tr>
<td>Total</td>
<td>650,000</td>
</tr>
</tbody>
</table>

Source: The European Medical Technology Industry, 2016, Medtech Europe
Biotechnology industry in Europe

**Biotechnology growth**

The biotechnological European companies had demonstrated a **moderated growth during the beginnings of the actual decade**, probably driven by the stagnant post-crisis European economies.

**Industrial biotechnology**

Bio-based industries are characterized by either use renewable resources and/or apply bio-based processes in their production processes. These are **worth nearly 2€T and provide approximately 22 million jobs in Europe** alone across sectors as diverse as agriculture, forestry, fisheries, food, chemicals and biofuels. European Industrial biotechnology is a world leader, producing more than 60% of the world’s enzymes.

Sales of products made by biotechnological processes in 2010 in Europe were **91.9€B representing 6.2% of total chemical sales** and are expected to continue to increase substantially in 2015 and 2020.

---

Source: Biotechnology in Europe, 2014, Ernst & Young.
Digital health industry in Europe

Digital health in the European Member States

In 2015, the 70% of EU member states already had national digital health policy or strategy, with an special interest in the following activities:

- National policies or strategies address telehealth in 62% of Member States, which means an increase of a 30% respect 2009.
- Government-sponsored mHealth programmes are in place in 49% of Member States.
- Although social media in health is widely used in the European Region, only 14% of Member States have a national policy or strategy on its use in health professions.
- Among Member States in the European Region, 59% have a national electronic health records system, and 69% of those have legislation on its use.

European Union digital health initiatives

European Union has started several initiatives to foster the digital health industry, from knowledge creation, as the green paper on mHealth or the “Growing the European silver economy” paper, to an digital health competition for digital health innovative companies, in which the enterprises we have listed below had stand out:

Source: Status of eHealth (digital health) in the WHO European Region, World Health Organization, 2016
Life sciences industry FDI into Western Europe

○ From 2014 to 2018 a total of 1,006 life sciences FDI projects were recorded in Western Europe. These projects represent a total capital investment of €22,489.2M which is an average investment of €22.3 M per project. During this period, a total of 46,548 jobs were created.

○ Spain is the 5th destination of life sciences industry FDI in Western Europe by investment projects, 6th by jobs created and 8th by capital investment.

○ Germany, United Kingdom, France, Ireland and Spain are the main countries of destination of life sciences industry FDI by number of projects received.

Source: fDi Markets, 2014 – 2018
Top 20 life sciences related companies investing in Western Europe

Companies with more projects in Western Europe are from EEUU.

Source: fDi Markets, 2014 – 2018
Companies investing in WE by number of projects and country of origin.
Top business activities and subsectors in Western Europe

**Top business activities**

- **Sales, marketing & support** is the top business activity by FDI projects into Western Europe in the life sciences industry.
- **Manufacturing** and **Research and development** are the following top activities.

**Top subsectors**

- **Pharmaceutical preparations** is the main subsector in terms of number of projects, capital investment and jobs created.
- **Medical equipment & supplies** is the second subsector in terms of number of projects and jobs created.

Source: fDi Markets, 2014 – 2018
Life sciences

Global sector overview
Life Sciences industry in Spain (I)

**Pharmaceuticals**

- More than 425 pharmaceutical companies have presence in Spain, and 60% of them are foreign enterprises.
- The investment in R&D of these companies represents the 20% of all private R&D Spanish spending, and the 12% of R&D employment in Spain.
- Spanish pharmaceutical industry is important in Europe:
  - 5th in turnover
  - 5th in job creation
  - 6th in pharma production
- Pharmaceutical Spanish exports grew by 1.1% in 2018, and accounted for 3.9% of Spain’s total exports.

**Medical Devices**

- Spain has more than 1,000 healthcare technology companies, which have a united turnover of 7,000€M.
- The exports of this industry reach €1,582.5 M in 2018 and represents the 12.6% of total Spanish life sciences’ exports, which are mainly directed to European markets (72%).
- The strong public healthcare system, composed by 800 hospitals and 300,000 professionals, represents a big client for the Spanish medical devices companies.
- The 73% of the total Spanish expenditure in medical devices is done by the public sector.

Life Sciences industry in Spain (II)

Biotechnology

- The Spanish subsector ecosystem consists of 620 biotech companies, with a total of 3,000 companies involved in biotech activities.
- Indirect biotechnology activities and companies turnover in Spain is up to 107,788€M, with an increase of 13.28%. Indirectly, biotech sector accounted for 10.35% of Spain’s GDP.
- The companies whose main business activity is biotech, which are near the 22% of companies that develop biotechnology activities, have reached a turnover of 8,200€M (0.8% of Spanish GDP) and 130,000 employees.
- Spain is the leader in the Agro-Biotech industry in the OECD, having cultivated more than 136,000ha of genetically modified organisms.

Digital health

- Spain has been a pioneer in the inclusion of digital health technologies as the electronic health records system and the digital prescription.
- A powerful Startup ecosystem, specially in regions like Catalonia, which have an increasing number of digital health companies (53% increase in 2015).

Sources: ICEX, Spain for Biotechnology, Pharmacy and Life Sciences, 2017. Informe Asebio, 2016
Main Spanish biotechnology ecosystems

Spain has 8 bio-regions defined:

- **Madrid BIO Clúster**: 16.1% of Spanish companies
- **Andalucía BIO Región**: 12.3% of Spanish companies
- **Canarias BioRegión**: 5% of Spanish companies
- **BioBasque**: 8.7% of Spanish companies
- **Bioga**: 27.6% of Spanish companies
- **BIOVAL**: 9.9% of Spanish companies

Source: ICEX, Spain for Biotechnology, Pharmacy and Life Sciences, 2017
3. The life sciences industry in Catalonia
The life sciences industry in Catalonia

Key data

Companies & ecosystem

Innovation

Foreign trade

FDI attraction
The Catalan life sciences industry: Key data

The life sciences industry in Catalonia is robust and a hot spot for business & innovation.

1,060 COMPANIES (2017)
- 280 biotech companies
- 180 professional services and consulting companies
- 176 medtech companies
- 139 providers and distributors
- 128 digital health companies
- 125 pharma companies
- 32 investing organizations

The company creation rate is about 1 new company per week.

17,802 M€ TURNOVER (2016)
- 3.4% of Catalan GDP.
- Pharma companies represent 47% of total turnover.

17,802 M€

Turnover is €31,087 M (7.2% of Catalan GDP) when healthcare services companies are included

53,731 EMPLOYEES (2016)
- Pharma companies concentrate 37% of people employed by the sector.

53,731

223,731 people are employed by the sector when healthcare services companies are included (7% of the working population in Catalonia).

Source: EIC (DGI – ACCIÓ) based on Scaling-up the BioRegion of Catalonia (2017) by Biocat
The dense pharmaceutical industry in Catalonia

125 COMPANIES (2017)
51.2% of pharma companies in Spain.
5 out of 5 top Spanish pharma companies are Catalan.

€8,355 M TURNOVER (2016)
1.5% of Catalan GDP.
47% of Catalan life science industry turnover.

19,875 EMPLOYEES (2016)
37% of Catalan life science industry employees.

R&D
Pharma Catalan companies have spent €304.9M in R&D, which stands for the 32.1% of the whole Catalan industry spending in R&D.
66.9% of the pharma companies established in Catalonia are considered innovative.

Catalan success stories
GRIFOLS ESTEVE ferrer Almirall

Exports
The Catalan pharma ecosystem is the most international within Spain, standing for the 45.1% of the whole country’s pharmaceutical exports.
Concretely, the Catalan pharma ecosystem set a new record in 2018 reaching €5,107M exported, which means the 7.1% of all Catalan exports.

Source: Scaling-up the BioRegion of Catalonia, for turnover, employment and companies data. Foreign trade data obtained from ICEX, 2018 (data for 2018 is provisional)
Fast-growing medical devices industry in Catalonia

176 COMPANIES (2017)
61% are specialized in Research and development.

€2,897 M TURNOVER (2016)
0.7% of Catalan GDP.
20.8% of Catalan life science industry turnover.

9,890 EMPLOYEES (2016)
18.4% of Catalan life science industry employees.

Dynamic environment
Catalonia is the 4th European country in medical technologies company density, being the 1st country in Southern Europe.

Catalan success stories

Exports
The Catalan medical devices ecosystem is the most international within Spain, standing for the 36.8% of the whole Spanish medical devices exports.
In 2018 medical devices exports increased by a 3.7%, compared to 2017, reaching a value of €583 M.

Source: Scaling-up the BioRegion of Catalonia, for turnover, employment and companies data. Foreign trade data obtained from ICEX, 2018 (data for 2018 is provisional)
The dynamic biotechnological industry in Catalonia

Catalonia ranks top among Spain’s autonomous communities in terms of internal expenditure on biotech R&D activities, reaching €454.7 M in 2015, which represents the 29.5% of total Spanish R&D expenditure within the sector.

R&D

Bioengineering and nanotechnology are considered top capabilities of Catalonia’s bioregion.

Top biotech technologies

Catalan success stories

Source: Scaling-up the BioRegion of Catalonia.
High innovative digital health industry in Catalonia

**Top academic center**
The Universitat Oberta de Catalunya (UOC) has started in 2017 the eHealth Center, the first academic center in southern Europe in digital health.

**Digital health tech centers**
22 digital health startups.

**Digital health apps**
A 60 Health mobile apps are intensively used in Catalonia. The ones that stand out the most are the virtual medical visits, the localization of health center and visit management.

**Catalan success stories**

Source: Scaling-up the BioRegion of Catalonia, for turnover, employment and companies data. Barcelona & Catalonia Startup Hub for startup data.
Catalan bioregion main capabilities

Biocat, the strategic agent and catalyst in the construction of the Catalan healthcare and life sciences ecosystem, has identified the **Catalan bioregion main research and tech capabilities**:

<table>
<thead>
<tr>
<th>RESEARCH</th>
<th>TECHNOLOGIES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TOP</strong></td>
<td><strong>TOP</strong></td>
</tr>
<tr>
<td>Oncology &amp; Immunotherapy</td>
<td>Genomics &amp; Epigenetics</td>
</tr>
<tr>
<td>Neurosciences</td>
<td>Nanotechnology</td>
</tr>
<tr>
<td>Global Health</td>
<td>Bioengineering</td>
</tr>
<tr>
<td>Veterinary</td>
<td>Photonics</td>
</tr>
<tr>
<td></td>
<td>Medical Chemistry</td>
</tr>
<tr>
<td><strong>MAJOR</strong></td>
<td>Bioinformatics</td>
</tr>
<tr>
<td>Metabolic Diseases</td>
<td>Big Data &amp; Supercomputing</td>
</tr>
<tr>
<td>Cardiovascular</td>
<td>Medical Imaging</td>
</tr>
<tr>
<td>Respiratory</td>
<td>3D Technologies</td>
</tr>
<tr>
<td>Public Health</td>
<td>Reproductive Technologies</td>
</tr>
<tr>
<td></td>
<td>Ophthalmology</td>
</tr>
</tbody>
</table>

- **40** Research centers
- **780** Life sciences research groups
- **18** University hospitals
- **3** Large-scale facilities
- **14** Science and technology parks

Source: Scaling-up the BioRegion of Catalonia, 2017
The life sciences industry in Catalonia
The life sciences ecosystem in Catalonia

Top Companies

Pharma & Biotech
- Actelion
- ISDIN
- Almirall
- Boehringer Ingelheim
- Sanofi
- Roche
- Gilead
- Pfizer
- Menarini
- AstraZeneca
- Novartis
- Bayer

Medical Devices
- Fresenius Kabi
- GAES
- Siemens
- Zimmer
- Boston Scientific
- GE Healthcare
- Olympus

Healthtech
- Pragmatic Diagnostics
- Innogenomics
- VMV
- Innoviva
- Biodesvice
- Bioncology
- Biotest

Hardware & Wearables
- enactec
- Temic
- Sagent
- iMagination
- Tinkerers
- BiWel

Digital health
- SharedExpertise

Biotech & Pharma
- BioLine
- Menarini
- Teva
- CellVizio
- Altea Bioscience
- Symrise
- Microbiol

Startups

Biotech & Pharma
- BioLine
- Menarini
- Teva
- CellVizio
- Altea Bioscience
- Symrise
- Microbiol

Medical Devices
- Fresenius Kabi
- GAES
- Siemens
- Zimmer
- Boston Scientific
- GE Healthcare
- Olympus

Healthtech
- Pragmatic Diagnostics
- Innogenomics
- VMV
- Innoviva
- Biodesvice
- Bioncology
- Biotest

Hardware & Wearables
- enactec
- Temic
- Sagent
- iMagination
- Tinkerers
- BiWel

Digital health
- SharedExpertise

Universities

- UPC
- Universitat Autònoma de Barcelona
- Universitat de Barcelona
- Universitat Pompeu Fabra
- Universitat Rovira i Virgili
- Universitat de Girona
- Universitat de Lleida
- Universitat de València

Conferences and Fairs

- WOC 2018
- MobileHealth
- IoT EXPO
- IDEIA
- BIO-Europe Spring
- 4YN
- CPH1 worldwide
- Connecting Startups

Clusters, Associations and Agencies

- biocat
- DIABOLOGICS
- farmInvest

Life sciences accelerators

- MOEBI
- KENKO
- HEALTH
- CRAASH
- Barcelona

- Howl
- What if
- CAIN
- Impulse
- Grants4Apps

- ErasmusPlus
- WM

Business Angels

- Esade
- BAN
- Ship2B
- BANC

International venture capital funds & investors

- Johnson & Johnson
- LS V
- Neotyra
- Roche
- GSK

Local venture capital funds

- YSIOs Capital
- Sabadell
- ALTA
- Lomeca
- Healthtica

University hospitals

- Bellvitge Hospital Universitari
- Hospital Universitari de Bellvitge
- Hospital Universitari de Sant Pau
- Hospital Universitari de Sant Joan de Déu
- Institut Català de la Salut
- Universitat Autònoma de Barcelona
- Hospital Universitari de la Plana
- Vilafranca
- Hospital Universitari de Vic
- Hospital Universitari de Sabadell
- Hospital Universitari de la Santa Creu i Sant Pau
- Hospital Universitari Germans Trias i Pujol

Hospital research inst.

- Vall d’Hebron
- Institute of Reina

Source: ACCIÓ and The Bioregion of Catalonia, Hospital excellence Index, 2017
Abundance of top life sciences companies

7 out of the 7 world top life sciences companies have presence in Catalonia

5 out of 5 top pharma Spanish companies are Catalan

Fine chemicals company leaders for life sciences

Fine chemicals subsector is crucial to develop raw materials and active ingredients for the pharma industry, and Catalonia’s production of those is outstanding, representing the 75% of the whole Spanish production. Concretely fine chemicals represents the 21.9% of the whole Catalan pharma sector turnover.

The Catalan fine chemicals subsector has increased its sales in the Spanish territory by a 2.8% in 2016. Anyway, its international focus has been increasing with recent entries in countries like Russia and China, maintaining Austria, EUA and France as the main destination countries.

Catalonia also has very important players in the international fine chemicals industry:

- **Bayer**: Producing APIs and their intermediates to international pharmaceutical companies for more than 50 years.
- **Ercros**: Top 3 world producer of basic fine chemicals for certain antibiotics, as fusidic acid or fosfomycins.
- **Esteve química**: Esteve develops active pharmaceutical ingredients (APIs) for the global pharmaceutical industry. Its industrial are in Europe, America and Asia.
- **Indukern**: World’s leader of fine chemicals distribution.

Source: Annual report about the Catalan industry, 2016
New life sciences companies in Catalonia

Number of companies evolution in Catalan BioRegion shows an uncontestable trend to growth with a medium annual growth of 4.7%; from 934 companies in 2013 to 1,060 in 2018.

- Nowadays there are 118 spin-off active in Catalonia, mainly emerged from universities, research institutes & hospitals. This high number of spin-off is due in part to the high number of research institutes, centers and university hospitals which are specialized in life sciences.

- Startups: more than 1,300 startups are located in Catalonia, many (13%) of them are classified among these three life sciences categories:

  - Healthtech: 79 startups
  - Biotech & Pharma: 63 startups
  - Medtech: 22 startups

Number of companies related to life science in Catalonia does not stop growing

Sources: Scaling-up the BioRegion of Catalonia, 2017. Barcelona & Catalonia Startup Hub, 2017
Very strong life sciences startup ecosystem

The graph has been drawn up using the data of 1,301 startups.

Source: Barcelona & Catalonia Startup Hub
Life sciences lead startups’ investments

Medtech and Biotech & pharma concentrate higher investments (Series A+B+C), together with Fintech & insurtech, than other sectors. **47%** of investments are **series A+B+C** in Medtech and **34%** in Biotech & pharma. Healthtech stands out in number of investments with **60 projects**.

**Main rounds of investment within life sciences startups (2018)**

**Biotech & Pharma**
€21.3 M
September 2018

**Healthtech**
€16 M
February 2018

Source: Barcelona & Catalonia Startup Hub, 2018
Catalonia, a place that educates toward success

- Catalonia has a large number of research organizations in the life sciences industry, concretely **89**, which are divided among: research centers (40), university hospitals (18), science and technology parks (14), universities offering life sciences studies (12), technology centers (2) and large scale facilities (3). Below more details about **universities**:

- Catalonia has the third best university system of Europe, and has a lot of life sciences degrees and masters. Besides, the university of Barcelona (UB) ranks among the top 100 universities of the world in Life Sciences and Medicine, Biological Sciences and Pharmacy & Pharmacology.

### Some life sciences programs in Catalonia

<table>
<thead>
<tr>
<th>Bachelor's Degrees in...</th>
<th>Master's Degrees in...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biochemistry</td>
<td>Applied Biotechnology</td>
</tr>
<tr>
<td>Bioinformatics</td>
<td>Biochemistry</td>
</tr>
<tr>
<td>Biological systems engineering</td>
<td>Bioengineering</td>
</tr>
<tr>
<td>Biomedical engineering</td>
<td>Bioinformatics</td>
</tr>
<tr>
<td>Biomedical sciences</td>
<td>Biomedicine</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>Genetics</td>
</tr>
<tr>
<td>Genetics</td>
<td>Molecular Biotechnology</td>
</tr>
<tr>
<td>Health and wellbeing sciences</td>
<td>Neurosciences</td>
</tr>
<tr>
<td>Medicine</td>
<td>Pharmacology</td>
</tr>
<tr>
<td>Pharmacy</td>
<td>Research, development and medication control</td>
</tr>
</tbody>
</table>

Catalonia counts on first class players

**Life sciences accelerators**

- MOEBIO Innovation Healthcare
- ACCIÓ Innovation Biocatalà
- NeoStart
- What-if
- Caixa Impulse
- HEALTHI
- SpireBioventures
- Grants4Apps
- KENKO Health Accelerator
- CREASH Barcelona
- MedTeQ

**Foreign-based venture capital funds & investors**

- Johnson & Johnson Innovation
- Roche
- Boehringer Ingelheim
- Chiesi Ventures
- OMEGA Funds
- KLSV
- Kurma Partners
- idinvest Partners

**Crowdequity platforms**

- crowdcube
- Capital Cell

**Business angels networks (BANs)**

- ESADE BAN
- Ship2B
- BANC
- IESE
- KEIRETSU FORUM

**Local venture capital funds**

- YSIOS CAPITAL
- Sabadell
- Caixa Capital Risc
- INVERSEADY Technology Investment Group
- avance:Biomed

Source: ACCIÓ & Biocat, 2017
Catalonia has strategic life sciences clusters, associations and agencies

Catalonia has an specific agency who acts as a strategic agent and catalyst in the construction of the Catalan healthcare and life sciences ecosystem. Its mission is to invigorate all the stakeholders of the BioRegion (companies, research groups and entities, hospitals and innovation support structures) to transform knowledge and technology into economic growth and to create a social impact.

A cluster initiative that aims to contribute to the competitiveness of the value chain of the biomedicine and health sector. It promotes the research, development and innovation of this area so that its business fabric will generate new biopharmaceutical products, services, medical technologies and digital health.

BIB is a non-profit association for the promotion of advanced research, knowledge and technology transfer, the stimulation of competitiveness and innovation within the industrial sector, and the provision of greater visibility as an international node in the field of Bioinformatics.

Fenin is a multi-sector federation that groups manufacturing, import and distribution companies and associations of healthcare technologies and products.

It is the National Trade Association of the Spanish based pharmaceutical industry. It gathers most of the R&D based pharmaceutical companies established in our country.

The Mental Health Cluster of Catalonia is a hub for innovation and business development in healthcare, homecare, and social services. The cluster has a broad knowledge of the mental health and neuroscience market through their members: private industry, public organizations, research and education institutions, mental health providers, hospitals, community services and technological centres.

Source: Biocat, 2017
A great and efficient health system

Spain has the most efficient public health system in the world, according to Bloomberg. Besides, the highest transplant rate in the world, the highest life expectancy at birth in the European Union and the 85% of patient satisfaction, are prove of the excellence of our health system.

Catalan hospitals also outstands as state-of-the-art research centers. In fact, the Catalan Institute of Health (ICS) is the leading health organization in Spain in number and quality of scientific papers published, having 5,331 dedicated researchers, publishing 3,960 papers in high impact magazines during 2016. Anyway, all Catalan health system has a high dedication and impact in research:

Catalonia has 4 of the 10 more valued Spanish hospitals

- CLÍNIC BARCELONA - 2nd most valued Spanish hospital
- Vall d'Hebron Hospital - 1st hospital for oncology and cardiology specialties
- QUIRÓN Dexeus - 1st hospital in the traumatology specialty
- CENTRO MEDICO TEKNON - 1st hospital in the neurology specialty

Sources: Annual report about the Catalan industry, 2016. Hospital excellence Index, 2017
Fairs and congresses enhance Barcelona as an international meeting point

The most important international meetings of the life sciences industry are in Barcelona. In addition, related sectors as ICT also hold their main congresses in Barcelona, such as the MWC.

Barcelona, the world’s 1st city in hosting international conferences and congresses in 2018 (ICCA, 2019)

Some congresses and conventions relevant for the life sciences industry in Barcelona

Source: EIC (DGI – ACCIÓ). Fira de Barcelona, Barcelona turisme, Convention Bureau, 2017
The life sciences industry in Catalonia
Catalan R&D in figures

1.46% of the Catalan GDP is dedicated to R&D activities

12th state among EU countries in terms of R&D personnel over total employment.

<table>
<thead>
<tr>
<th>Metric</th>
<th>2017 (CAT/SPAIN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total R&amp;D expenditure (M€)</td>
<td>3,273.4 (23.3%)</td>
</tr>
<tr>
<td>Business expenditure (M€)</td>
<td>1,916.1 (24.8%)</td>
</tr>
<tr>
<td>Number of technology companies (2014-2016)</td>
<td>4,024 (21.8%)</td>
</tr>
<tr>
<td>R&amp;D personnel (FTE*)</td>
<td>48,551 (22.5%)</td>
</tr>
<tr>
<td>Patent applications to EPO (2017)</td>
<td>633 (37.6%)</td>
</tr>
<tr>
<td>Number of innovative companies (2014-2016)</td>
<td>9,282 (22.2%)</td>
</tr>
</tbody>
</table>

*FTE: full-time equivalent.

A world leader in clinical trials

- Spain has been the first European country to pass national legislation on clinical trials since the new European regulation was published. In fact, **Spain ranks second in Europe in number of clinical trials, and the 78% of approved trials involve at least one centre located in Catalonia**, likewise 55% of clinical trials conducted in Spain are submitted to Ethics Committees in Catalonia.

- In Catalonia in January 2015 there were more than 2,740 sites participating in clinical trials, featuring 2,000 experienced clinical-trial researchers, with more than 13,400 patients recruited.

Catalonia is specialized in the phase III trials, which seek for large number of patients with specific diseases. **Oncology and infectious diseases are the main therapeutic areas** in which clinical trials are conducted in Catalonia.

**Phase I**: trials aim to find the best dose of a new drug with the fewest side effects in a small group of people

**Phase II**: trials further assess safety as well as if a drug works in medium groups.

**Phase III**: assess the side effects and results of the drugs compared in large groups.

**Phase IV**: test new drugs approved by the regulating agency in thousands of patients.

Source: Barcelona Clinical Trials Platform, 2017. BCN, Seat of the European medicines agency, 2017
Catalonia offers top technological centres & scientific facilities specialised in life sciences (I)

2 major technologic centres

3 major scientific leading facilities
Catalonia has large scientific facilities which are considered world leading:

- ALBA Synchrotron, the largest particle accelerator in Southern Europe.
- Mare Nostrum (BSC), 3rd Southern European Supercomputer
- National Genome Analysis Center international biomedical research institute of excellence

14 technology and science parks
Catalonia offers of top life sciences technology and science parks:

Sources: Biocat & ACCIÓ. Technological centres websites
Catalonia offers top technological centres & scientific facilities specialised in life sciences (II)

40 life sciences research centres

Catalonia offers of top life sciences research centers with a wide range of specialties:

Sources: Biocat & EIC (DGI – ACCIÓ). Technological centres websites
The life sciences industry in Catalonia
International insight of Catalan life sciences industry

During the year 2018, Catalan life sciences exports reached a record of €5,689.6 M (growth of 1.8% between 2017 and 2018).

Life science industry exports represent 7.9% over total Catalan exports (2018).

Between 2008 and 2018 Catalan life science exports increased by a 6%.

The Catalan pharmaceutical exports set a new record of €5,022.4 M (growth of 1.6% between 2017 and 2018).

Pharma exports represent the 77.3% of total export within the sector in Catalonia.

Source: EIC (DGI – ACCIÓ) based on ICEX, 2008-2018 (data for 2018 is provisional)
Catalan life sciences industry looks to WE

- Catalan life sciences exports are mainly directed to Western Europe.
- Switzerland outstanding imports from Catalonia are explained in part by the presence in the region of important manufacturing centers from the top pharma Swiss companies.

Exports. Main destinations (2018)

- Value exported in €M

Imports. Main origins (2018)

- Value imported in €M

- Catalan life sciences imports mainly come from Switzerland, USA and Germany.
- Main commercial partners in terms of imports are located in Western Europe.

Source: ICEX, 2018 (provisional)
Catalan life sciences companies internationalization

Main Catalan life sciences companies in the world

- Grifols
- Ferrer
- Estève
- Almirall
- Bayer
- Menarini
- Bioiberica
- Braun
- Sanofi

Main Catalan life sciences exporting companies

- Grifols
- Werfen Life
- Estève
- Ferrer
- Almirall
- Sandoz (a Novartis company)
- Boehringer Ingelheim
- Chemo Licensa
- Novartis

Source: EIC (DGI – ACCIÓ), 2017
The life sciences industry in Catalonia
Catalonia is the place to be for life sciences

- On the global radar for foreign investment
- Highly connected region
- Strong and innovative Industry
- Major pool of local and international talent
- World class R&D hub
- Southern Europe’s top startup hub
On the global radar for foreign investment

THE CATALAN LIFE SCIENCES INDUSTRY REGISTERED BETWEEN 2014-2018

- **24 FDI projects**
- **€383 M of capital investment**
- **1,171 jobs created**

Catalonia leads life sciences FDI reception in Spain

- **37.5%** of the FDI projects received
- **42.6%** of the capital investment
- **44.5%** of the jobs created

Compared to Western Europe, Catalonia concentrated **3%** of the **jobs created** within the sector.

Catalonia was the **8th Western European region in jobs created**.

Source: EIC (DGI – ACCIÓ) based on fDi Markets, 2014 - 2018
**Strong and innovative industry**

### Leading life sciences companies

- **1,060** life sciences companies
- **7 out of 7** top world’s life sciences companies
- **5 out of 5** top Spanish pharma companies are Catalan

### High life sciences company density in Europe

- **1st** in pharma
- **3rd** in biotechnology
- **4th** in medical technologies

### New companies emerge in Catalonia

- **+144** new life sciences companies between 2015-2017
- **118** active life sciences spin-off
- **164** life sciences startups

### The best health system

- **1st** most efficient public health system in the world (Spain)
- **1st** highest life expectancy at birth in the European Union
- **4 out of 10** most valuated Spanish hospitals are Catalan

### Research organizations, associations and clusters

- **1st** bioregion of Spain
- **5** life sciences clusters
- **Top** accelerators and incubators
- **40** life sciences research centers
World class R&D hub

Catalonia is currently one of the leading research hubs in Europe.

<table>
<thead>
<tr>
<th>Points of Interest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.47% of its GDP dedicated to R&amp;D.</td>
</tr>
<tr>
<td>9,282 innovative companies, representing 22.2% of the Spanish total.</td>
</tr>
<tr>
<td>Catalonia concentrates the 23.3% of Spain’s total R&amp;D expenditure.</td>
</tr>
<tr>
<td>Despite representing only 1.2% of the European Research Area population, Catalonia has already attracted 4.6% of H2020 FET Flagship funds.</td>
</tr>
<tr>
<td>12th state among EU countries in terms of R&amp;D personnel over total employment.</td>
</tr>
</tbody>
</table>

The convergence of strategies from the Government of Catalonia, Barcelona City Council, Mobile World Capital Barcelona Foundation and certain universities, research and technology centers and companies, is already helping to create a smart environment. Barcelona has become the new “place to be” in Europe.

Companies setting up new innovation centers in Catalonia in 2018

3 major scientific leading facilities.
2 major technologic facilities.
40 life sciences research centres with a wide range of specialties.
14 life sciences technologic and scientific parks.

Source: INE. Scaling-up the BioRegion of Catalonia (2017) by Biocat. EIC (DGI – ACCió)
Highly connected region

Southern Europe's largest intermodal logistics hub.

Catalonia is home to two of the main ports in the Mediterranean, a high-speed train station, an awarded international airport and highways seamlessly connected to the rest of the European road system.

Top International ports of Barcelona and Tarragona

- 4M passengers and 95MT in goods traffic
- Connection with more than 825 ports around the world with 100 regular lines connecting directly with 200 overseas ports
- Short maritime transit times and high frequency of ships reduce stock costs.
- The Port of Barcelona is the 3rd most productive in Europe.

Barcelona-El Prat, world class airport

- 100 airlines flying to 200 different destinations in 57 countries around the world.
- The Air Freight Facility with 47.1 hectares is integrated in a unique logistics platform in Europe: an area covering a 7 kilometer radius and with 2,000 hectares dedicated to logistics.
- In 2018, Air Cargo in Barcelona achieved its higher traffic volume with 172,940 tonnes, an increase by 11% from 2017 due to implementation of new air routes.

An extensive rail network and road infrastructure

- Catalonia is the main European region in terms of provision of road infrastructure of four or more lanes (48.7 km/ 1,000 km2)
- 1st Spanish region in both volume of intraregional and international road freight transport
- An extensive rail network with almost 1,800 km connecting the main cities in Catalonia with the rest of Spain and France, including 400 km of high speed rail.
- Only location with in Spain with standard gauge for merchandises.

Southern Europe’s top startup hub

+1,300 STARTUPs ARE LOCATED IN CATALONIA

13,820 jobs related to Catalan startups.

13% of startups are Deep Tech.

3 out of every 4 Catalan startups have obtained financial backing.

Life sciences startups are the 2nd most numerous.

1st startup hub in Southern Europe.
EU-Startups, 2017

4th European city in investment received by startups.
Atomico, 2017

3rd preferred hub by creators of startups.
Startup Heatmap Europe, 2018

Source: startupshub.catalonia.com (Barcelona & Catalonia Startup Hub)
Major pool of local and international talent

Barcelona talent attraction

One of the world’s top spots to live and work in. A magnet for young professionals and researchers from all over Europe

1st city in Southern Europe in terms of connectivity


4th world city in labour attractiveness

5th city in the world in terms of livability

6th world city in terms of best reputation

8th best city in the world

Best Location and personnel at competitive costs

TOP: Barcelona is the most competitive city in operating costs for the life sciences industry

<table>
<thead>
<tr>
<th>City</th>
<th>Operating Costs (€/m²/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcelona</td>
<td>18.39M€</td>
</tr>
<tr>
<td>Madrid</td>
<td>19.39M€</td>
</tr>
<tr>
<td>Milan</td>
<td>20.89M€</td>
</tr>
<tr>
<td>Dublin</td>
<td>21.73M€</td>
</tr>
<tr>
<td>Amsterdam</td>
<td>22.54M€</td>
</tr>
<tr>
<td>Berlin</td>
<td>24.21M€</td>
</tr>
<tr>
<td>London</td>
<td>25.86M€</td>
</tr>
<tr>
<td>Paris</td>
<td>28.52M€</td>
</tr>
</tbody>
</table>

For a detailed comparison of labour costs see annex 3

TOP: Barcelona has the most competitive profile costs for office space (€/m²/year)

<table>
<thead>
<tr>
<th>City</th>
<th>Office Space Costs (€/m²/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcelona</td>
<td>338.13</td>
</tr>
<tr>
<td>Berlin</td>
<td>362.81</td>
</tr>
<tr>
<td>Madrid</td>
<td>433.47</td>
</tr>
<tr>
<td>Amsterdam</td>
<td>435</td>
</tr>
<tr>
<td>Milan</td>
<td>515</td>
</tr>
<tr>
<td>Dublin</td>
<td>722</td>
</tr>
<tr>
<td>San Francisco</td>
<td>745.63</td>
</tr>
<tr>
<td>Paris</td>
<td>902.13</td>
</tr>
<tr>
<td>London</td>
<td>1332.93</td>
</tr>
</tbody>
</table>

1. fDi Benchmark bio-pharma manufacturing plant. Includes Labour, Property and Utility costs

Catalan world-famous life sciences talent

Valenti Fuster
Director of Mount Sinai Heart (New York). Editor-in-Chief of the Journal of the American College of Cardiology.

Elias Campo
Director Research and Innovation Director at Hospital Clinic, Director of IDIBAPS (Barcelona).

Josep Baselga
Physician-in-Chief and Chief Medical Officer at Memorial Sloan Kettering Cancer Center.

Joan Massagué
Director of the Sloan-Kettering Institute (New York). Internationally recognized leader in the study of cancer metastasis and cell behavior.

Josep Tabernero
Head of the Medical Oncology Department at the Vall d’Hebron University Hospital. Director of the Vall d’Hebron Institute of Oncology.

Rafael Rosell
Recognized as the European leader in lung cancer by The Lancet, is author of more than 600 scientific papers in oncology.

Sources: ACCIÓ, 2017, Catalan University department, fDi Benchmark, 2017
4. Opportunities in the life sciences industry
The life sciences industry in Catalonia

International market opportunities

Investment and technological opportunities
International market opportunities

Source: Global trade mapping, 2019 by EIC (DGI – ACCIÓ)
The life sciences industry in Catalonia

International market opportunities

Investment and technological opportunities
Investment and technological opportunities

Investment opportunities

Trends and sector opportunities
- Digital health
- Medtech
- Oncology
- Silver economy
- Big data

Value chain
- Clinical trials
- R&D centres
- Pharma production
- Logistic centres

Technology opportunities
- AI
- VR & AR
- IoT
- Robotics
- Blockchain
- 3D printing
- Nanotech
- Quantics
- Biotech
- Genomics
- Neurosciences
- Pharmagenetics
Digital health innovators and early adopters

TREND DESCRIPTION

Digital health will strongly grow as a trend in the next years fueled by the IoT and wearables proliferation, together with the higher consumer acceptance of virtual medical assistance and the consumerization of patients.

As disruptive countries, Catalonia and Spain are early adopters in IoT devices (world’s 8th) and high-speed networks (Europe’s 1st). This innovative culture is also demonstrated by the Catalan strong startup ecosystem. Barcelona is considered the 4th tech city in the world and 5th Tech Hub of Europe.

Barcelona has great scientific and tech centers, and hosts the most important international meetings and conferences in digital health related topics.

WHY CATALONIA

Strong innovative digital health startup ecosystem

Top R&D HUB

Qualified talent available in a cosmopolitan and attractive environment

Early adopter society

Top scientific & tech centers

Strategic location and access to markets

Digital health related events

Source: OECD Digital Economy, 2015, Fundación Telefónica, 2015
High technological medical devices

**TREND DESCRIPTION**

Medical devices is expected to grow globally more than a 5% CAGR until 2020, mainly driven by IoT innovation and low-latency 5G technologies.

Catalonia is the 4th European country in medical technologies company density, with a growing turnover of a 25% CAGR (2011-2014). These companies are mainly of high technology and personalization (47.4%), and those of mid-high technology and long duration represent the 47.5% of the Catalan’s medtech turnover.

The world renowned state-of-the-art Catalan hospital system is a major client for the medical devices companies established in Catalonia.

**WHY CATALONIA**

- Strong and innovative Industry
- Top R&D hub
- Qualified talent available in a cosmopolitan and attractive environment
- Top scientific & tech centers
- Strategic location and access to markets

Silver economy strong ecosystem

**TREND DESCRIPTION**

The proportion of people over 60 years old is expected to increase dramatically over next years, as well as their life expectancy. Besides, aging people is changing its consume preferences, pursuing a higher well-being with an active and healthy life.

Catalan women have the highest life expectancy in Europe. At the same time, the crowded baby boom generation (38.5% of population) is reaching the silver age interval in Catalonia, standing for more than 2.8M people.

ACCIÓ identified a strong Catalan silver ecosystem, composed by 545 companies, with a total turnover of 9,003€M. Assistance and well-being outstand as silver subsectors, as well as pharma products and healthy food companies. Many of them take a great advantage of the strategic geographic situation of Catalonia to reach international markets.

**WHY CATALONIA**

- Strong and innovative Industry
- Strategic location and access to markets
- Qualified talent available in a cosmopolitan and attractive environment
- Ageing and long life expectancy society with high purchasing power
- Entrepreneurship and Creativity

**COMPANIES**

- Novartis
- Roche
- Nestlé
- Hartmann
- CREB
- eurecat
- LEITAT
- SANOFI
- GRIFOLS
- DANONE
- Unitier

**RESEARCH CENTERS**

- I2Cat
- Unitier

**Oncology leaders in R&D**

**TREND DESCRIPTION**

Global Oncology is expected to reach 111.9$B by 2020, growing at a 7.1% CAGR from 2014 to 2020. Recent progress in biological therapies has widened the scale of therapeutic targets for treatment of cancer.

In Catalonia oncology is the therapeutic area to which more R&D resources are allocated, concretely the 36% of the total biomedical investment in innovation. In fact, Oncology is defined as a top research area of the Catalan bioregion. Furthermore, Catalan extensive clinical trials are mainly focused in oncology treatments (35% of all clinical trials).

Catalan innovation and R&D is conducted by its world renowned oncology leaders, as well as the top-notch Catalan university hospitals and research centres. For example, IRB has recently discovered a new colon cancer treatment.

**WHY CATALONIA**

- Top R&D HUB
- Top scientific & tech centers
- World famous oncology leader figures
- Qualified talent available in a cosmopolitan and attractive environment
- Strategic location and access to markets
- 4th best European city for scientific production (Science Business, 2016)

**RESEARCH CENTERS**

- IRB
- Vall d’Hebron Institut de Recerca

**MAIN CATALAN LEADERS**

- Joan Massagué
- Josep Tabernero
- Rafael Rosell

Source: Biocat, 2017. Alliedmarket research, 2017
Innovative big data hub

**TREND DESCRIPTION**
Digital devices, wearables and electronic patient records initiated big data usage in the life sciences industry, using data to develop better treatments and launch them faster. Other important life sciences big data applications are: predictive & prescriptive analytics, genomics and a smoother hospital administration.

Catalonia is leading big data in Europe, above UK and Germany in number of big data projects, according to a recent European Commission study. Catalonia has a top big data ecosystem full of big data startups, conferences including the leading Big Data Conference, and Industry giants like HP, Oracle and IBM.

Spain has been a pioneer in the inclusion of information technologies in the life sciences industry, as the electronic health records system and the digital prescription. Big data research projects on diseases as diabetes and Parkinson have been carried out in the BSC and CRG, and published in important journals.

**WHY CATALONIA**
- Strong and innovative Industry powered by a top R&D HUB
- Home to Global Digital HUBs (Nestlé, Servizurich, TÜV, Roche D.)
- Qualified talent available in a cosmopolitan and attractive environment
- Data processing centers and BCN Supercomputing Center
- Big data congress in Barcelona

**COMAPNIES PERFORMING BIG DATA IN CATALONIA**
- IBM
- Mind the Bridge
- T·Systems
- Nestlé
- Roche
- Zurich
- Projecte PADRIS

**FACILITIES AND TECH CENTERS**
- BSC
- Eurecat
- CNAG
- CRG

World leaders in clinical trials

TREND DESCRIPTION
Antibiotic resistance and new disease appearance will propel the need for new medicines and thus, clinical trials. This market has been estimated in 14.2$B for 2016 and is projected to reach around 22$B by 2021, growing at a CAGR of 7.5%.

Spain ranks 2nd in Europe in number of clinical trials, and the 78% of approved trials involve at least one center located in Catalonia, likewise 55% of clinical trials conducted in Spain are submitted to Ethics Committees in Catalonia.

Catalonia had more than 2,740 sites participating in clinical trials, featuring 2,000 experienced clinical-trial researchers, with more than 13,400 patients recruited (2015).

The Catalan clinics are specialized in phase III trials (44% of all trials), and oncology stands for more than a third of the whole clinical trials by medical areas.

WHY CATALONIA
Strong and innovative Industry
Top R&D hub
4th best European city for scientific production
(Science Business, 2016)
Barcelona clinical trials platform
Qualified talent available in a cosmopolitan and attractive environment

INSTITUTIONS CARRYING CLINICAL TRIALS

Top destination for R&D centers

TREND DESCRIPTION

The downward effectiveness of traditional antibiotics, together with the trend of personalization of treatments, calls companies to increase its research to develop new drugs and more customized medicines.

To perform effective R&D in the life sciences industry a coordination between different kind of agents is needed, and Catalonia has a rich ecosystem of all of them: tech centres (40), universities (12), university hospitals (18), life sciences companies (1,060), enjoying the most dense European pharma company industry.

The Catalan R&D is specially strong in oncology, where state-of-the-art hospitals and world famous specialists had born. This research is endorsed by more than 2,740 centers, featuring 2,000 experienced clinical-trial researchers, with more than 13,400 patients recruited.

WHY CATALONIA

Top R&D HUB

4th best European city for scientific production (Science Business, 2016)

Top scientific & tech centers

Qualified talent available in a cosmopolitan environment

Strong and innovative Industry

Best location and personnel at competitive costs

R&D FDI COMPANIES

- Boehringer Ingelheim
- AstraZeneca
- harlan
- accord

RESEARCH

HOSPITALS

- Vall d’Hebron Hospital
- CLÍNIC BARCELONA

Source: Biocat, 2017
Pharmaceutical manufacture center

**TREND DESCRIPTION**

Innovative drugs, powered by the antibiotics resistance, and the industry concentration is expected to power the growth of pharmaceutical companies at a pace of 4.4% CAGR until 2020.

The Catalan pharma ecosystem is the most dense of Europe in number of companies per million of inhabitants. Besides, Spanish fine chemistry subsector is highly concentrated in Catalonia (75% of Spanish production), hosting top companies in this field. In addition, Catalonia in the fifth European region receiving pharmaceutical FDI. The combination of a strategic location with amazing logistic connections, the ability of attracting international talent, together with the availability of national talent at a competitive costs makes Catalonia a top region for pharmaceutical manufacturing plants.

**WHY CATALONIA**

- Strong and innovative Industry
- Strategic location and access to markets
- Qualified talent available in a cosmopolitan and attractive environment
- Top scientific & tech centers
- Business Mindset

Top global technological trends in Catalonia (I)

Disruptive technologies are creating new business models and changing the way traditional sectors work. Concretely, 12 breaking technologies are identified as the main drivers of evolution and disruption. Health is the sector in which more of these technologies are expected to drive to dramatic changes, in fact, all the 12 breaking technologies identified are expected to be applicable in the life sciences industry:

- **AI**
  - Catalonia hosts Amazon’s new AI center, and offers specific research centers as IIIA. The public Catalan health system is already using AI in the data and information management. 53% of the industry believe that AI will result in a significant change in life sciences, improving diagnostic capabilities and facilitating interactions.

- **VR & AR**
  - State-of-the-art Catalan hospitals have already introduced virtual reality to train highly qualified medical professionals. Life sciences is the 2nd industry in which virtual reality has a higher projected revenue ($5.1B) and Catalonia already has a strong VR/AR ecosystem.

- **Robotics**
  - Catalonia ranks 8th in the global ranking of robot density, with 130 unities for each 100,000 workers. The strong Catalan industrial ecosystem is a huge potential client for robotisation. The robotics division of ABB have chosen Catalonia to establish its global digitalization project, which hopes to start a talent and innovation hub in life sciences robotics.

- **Blockchain**
  - By applying shared ledgers, smart contracts and powerful encryption technology, the top Catalan pharmaceuticals and medical devices companies can eliminate costly intermediaries and more effectively ensure security, immutability, transparency and trust across the value chain.

- **IoT**
  - Catalonia hosts the world’s most important internet of things conference (IOTSWC), as well as the Mobile World Conress. Barcelona, as the 2nd Smart City of the world, is a great place to test and implement IoT solutions.

- **3D printing**
  - Barcelona is one of the world’s most important locations for 3D printing. The Global 3D Printing Hub, with more than 10,000 m² supported by Hewett Packard and Renishaw, is a leading research center. Important events in the industry are also held in Barcelona, as the IN(3D)USTRY hub fair.

Top global technological trends in Catalonia (II)

Catalonia offers a European leading dedicated research centre for nanoscience and nanotechnology, the ICN2, which has 140 nanotech researchers. The advanced materials cluster or the IBEC’s Nanotechnology Platform complete the Catalan strong nanotech ecosystem.

The Barcelona Supercomputing Centre is foreseen to be the most powerful supercomputer in EU after its expansion. It is equipped with the newest superconducting quantum circuits technology to create quantum algorithms for quantum computation, quantum simulation and quantum annealing.

4 of these 12 technologies are life sciences specific:

- Biotechnology
- Genomics
- Neurosciences
- Pharmagenetics

The Catalan life sciences and biology ecosystem is composed by the most strong and innovative companies and research institutions. Having the most dense pharma ecosystem of Europe, the biggest biotech industry in Spain and a high technological and fast-growing medical devices sector, Catalonia offers the most complete life sciences business ecosystem in Southern Europe. Catalonia has as well more than 40 leading scientific, technical & research centres which are strategic for the development of life sciences industries. Innovation is also one of the main characteristics of the Catalan life sciences industry, with more than 118 active spin-off and more than 164 startups, together with the creation of more than 144 companies related with life sciences sector between 2015 and 2017. In addition, Neurosciences, genomics & epigenetics are classified as top Catalan bioregion capabilities by Biocat, the strategic Catalan life sciences agent and catalyst.

Source: Barcelona Supercomputing Center, 2017. Biocat, 2017
Take a look at the full report:

More information about the sector and related news: