

# The Italian Biotech Industry

## *Facts & Figures*



**BioInItaly<sup>®</sup>**  
Report 2020



**FEDERCHIMICA  
ASSOBIOTEC**

Italian Association for the Development  
of Biotechnology

**ENEA**

Italian National Agency for New Technologies,  
Energy and Sustainable Economic Development

**ITCA<sup>®</sup>**

ITALIAN TRADE AGENCY



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# Introduction

The new report on the Italian biotech industry, prepared thanks to the consolidated cooperation between Assobiotech (Italian Association for the Development of Biotechnology, part of Federchimica) and ENEA (National Agency for New Technologies, Energy and Sustainable Economic Development), is being released during an emergency situation for the country.

Gathering, processing and analysing the information and the updated estimates provided by the companies activities in this field at the end of 2019, by the 2018 financial statements, public data and by the National Statistical System, this report, by its nature, cannot include any element related to the coronavirus pandemic which has hit the country and the entire world. On the other hand, the country's biotech industry situation in 2019, portrays a unique international image for the whole sector, given by its richness and information completeness, setting the basis for the evaluation of its strengths and weaknesses, opportunities and threats, especially in light of the dramatic events which represent an alarm bell for the healthcare system but also for the economic and environmental sustainability of the current production and consumers models, for the survival of the planet. It is for this reason that we need to take a closer look at the Italian biotech field and the related R&D activities, moving on to the in-depth analysis of two macro areas: the healthcare field, made up of diagnostic, vaccine prevention and therapeutical solutions and the bioeconomy which includes agriculture, veterinary, industry and environment.

The data observed by the National Statistics Programme will flow into the industrial biotech statistics developed by OECD - The Organization for Economic Cooperation and Development, from which the report borrows the methodology, setting a solid base to develop programmes for a more sustainable and better future.

On the basis of this data, the Italian biotech industry proves to be a growing field with a number of companies which has consolidated in time, but should strengthen in terms of size,





also in order to improve its competitiveness on an international level. The R&D activities are a true strong point, with real excellence in all biotech fields of application. As a confirmation, we need to take a look at the quick response by some companies within this field, all associated with Assobiotech, which have been able to promptly react with competence to the health emergency caused by the spread of the SARS-CoV-2 virus, both in the diagnostic and vaccines field. With reference to the response given by the whole field on the coronavirus subject and the effects on the companies, we have dedicated an appendix which has been integrated into the 2020 biotech companies report.

It is during emergency crisis that we realize how important it is to invest in research and give trust to an industrial field such as biotech, that now more than ever is to be considered fundamental, in order to face challenges and take the opportunities on a national and international level.

We would like to conclude this introduction with the wish that the overall qualitative and quantitative picture of the Italian biotech can contribute to set the basis so that we all, together with the institutions and the public and non-profit research field, can get going and define a national strategy aimed at the development of a long term plan for innovation and research, made up of stable measures and an efficient, definite and centralized governance. We are ready to share these measures which will allow companies to overcome the limits of a field which at times is too small, and guarantee important benefits for the country in terms of economic and job-related developments, supporting Italy's growth and competitiveness.

Riccardo Palmisano  
Assobiotech – Federchimica President

Federico Testa  
ENEA President

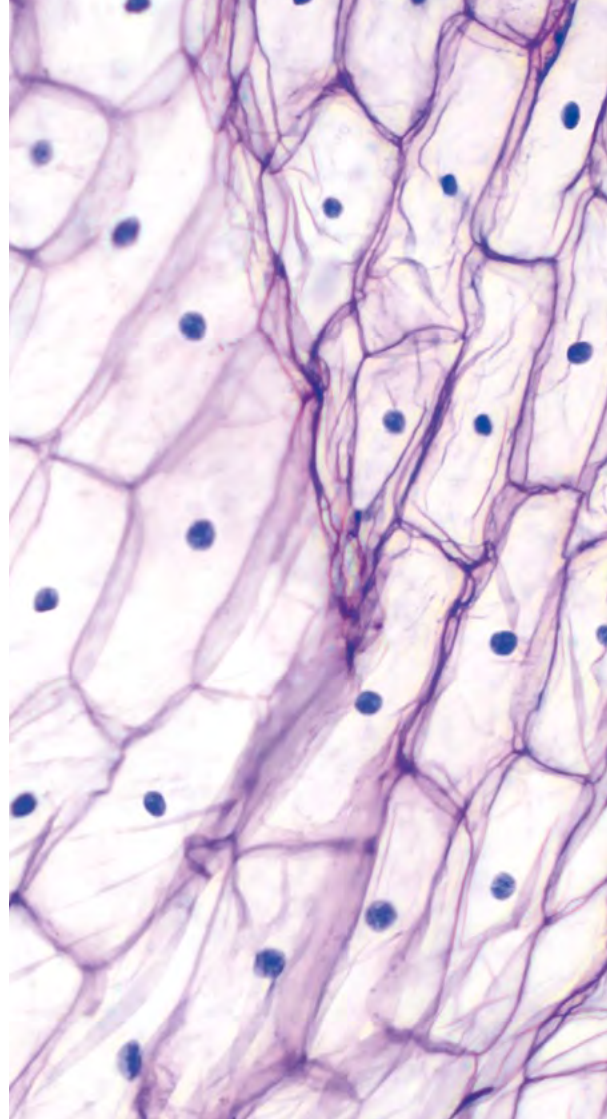


# 1. Executive summary

## A growing industry with high research intensity...

- The Italian biotech industry has recorded a growth in all the main economic indicators, with a total number of companies which has stabilized at around 700 units. At the same time, a major spread of the activities on the national territory has been observed, even though the emergence of new areas, with respect to the typical settlements (north western area and central Italy) will occur following the dimensional growth of the productive fabric.
- The overall investment in R&D activities for all the companies taken into account have reached 2.3 billion euros, while the investments in biotech R&D exceed 770 million euros. The latter recorded a 7% and 25% growth with respect to 2016 and 2014, respectively.
- With respect to the manufacturing industry, the share of the biotech R&D investments on the biotech turnover is way larger: 4 times larger for the biotech companies; 9 times larger for the dedicated biotech R&D firms; 20 times larger for the nationally controlled dedicated biotech R&D firms.
- 49% of the biotech companies is mainly involved in the human health field, which historically speaking, was the first industry to drive the development of the biotechnologies. 39% of the biotech companies is involved in the production and/or development of products and services for industrial or environmental applications (29.9%) or for the veterinary, agricultural and zootechnic applications (8.6%) and represent one of the main innovation incentive for the bioeconomic field.

The Genomics, Proteomics and Enabling Technologies application fields appear to be present in 12% of the companies



# ...which still needs to realize its full potential

- An identical industrial distribution can be found among the innovative start-ups, which represent 20% of the national biotech companies.
- The Italian biotech industry has not been able to express its full potential and value. This is proven by the lack of large Italian capital leading companies compared to the large number of companies, which are innovative but usually too small to establish themselves on the market.
- 80% of the Italian biotech industry is made up of small and micro companies, which have been a real driving force for the growth of the entire industry. Between 2017 and 2019, 50 new innovative start-ups active in the biotech field have been registered.
- In the last five years (2014-2019), the number of SMEs active in the biotech field has increased, with a 20% growth within the same period. This event is linked to the merge & acquisition operations with which companies operating in traditional industries, have acquired the biotech activities and know-how from start-ups.
- Two thirds of the biotech turnover is being generated by foreign capital companies, which represent only 11% of the companies taken into account and are mainly active in the human health industry.
- The Italian capital companies instead, generate more than half of the biotech turnover in the industrial and environmental field of application, reinvigorating the traditional chemical specialization of the national productive fabric.

# Biotech for Healthcare

- The picture of the Italian biotech firms confirms the primacy which has been reported in previous surveys, for those companies which operate in the biotech industry applied to healthcare, which currently are 344 and represent roughly half of the total Italian biotech companies (49%).
- The healthcare field generates a preponderant share of the total turnover, corresponding to over 9 billion (75% of the total), it determines the vast majority of the total R&D investments (91%) and holds 75% of the R&D biotech employees in Italy.
- There are 208 companies dedicated to biotech R&D, which devote 75% or more of their total intra-muros R&D investment to biotech R&D, 92% of which are nationally controlled: a figure which highlights how biotech opens up important opportunities for early-stage research within the pharmaceutical industry.
- There are 375 new therapeutics projects undergoing study in Italy, undertaken by Italian capital companies: 131 in discovery phase, 171 in the preclinical development phase and 73 in the clinical phase (14% in phase I, 11% in phase II e 5% in phase III).
- The Italian biotech strongly invests in those diseases which still lack adequate therapeutic solutions. The national biotech research interest is focused on developing therapeutical solutions for oncology. 2019 has seen the development of clinical trial products for the infectious diseases as well.
- Utmost importance is also given to the diagnostic products: considering all the Italian biotech companies, 199 of these develop products and diagnostics for human health.



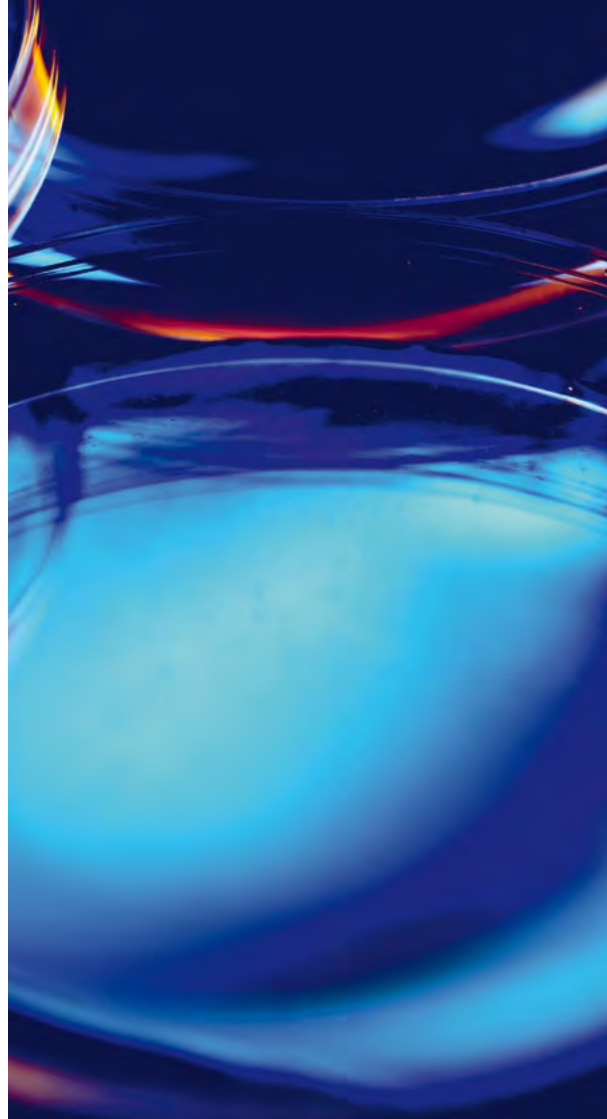


- There are 84 companies working in the Genomics, Proteomics and Enabling Technologies field – GPET (12% of the total biotech companies in Italy).
- They carry out basic research activities, which is a driving force for all biotech fields of application and offers several services related to these industries. From genes to proteins and up to biochips and bioinformatic technologies, we can observe a prevalence in the use of «omic» technologies (genomics, proteomics, transcriptomics, etc.) and in the Big Data analysis through bioinformatic approaches.



# Biotechnology, Bioeconomy's driving force

- The biotechnologies underpin the innovation capacity of the bioeconomy, intended as a system that utilizes terrestrial and marine biological resources, in addition to waste, to produce fuel and energy products as well as to provide inputs for industrial production processes.
- According to Intesa Sanpaolo-Assobiotech estimates («V Bioeconomy report in Europe», 2019) the overall activities connected to the bioeconomy in Italy, has generated roughly 328 billion euros in 2017 employing over 2 million people.
- The bioeconomy's importance over the total economic activities in Italy, has grown in the last 10 years, going from 8.8% over the national total in 2008, to 10.1% in 2017.
- Italy has several flagship biorefineries, which are unmatched worldwide, for the production of important bio-based intermediate chemicals. Among these, there are the first worldwide plant for the production of biobutanol in Veneto region and the plant for second generation bioethanol in Piedmont.
- Several local industries have been developed in our country, set up to exploit the agricultural scraps and food by-products in order to develop new innovative bioproducts, with several start-ups set up in the last few years.
- Last but not least, the excellence in the biotech food farming field, and the great potential in exploiting the marine biomass, thanks to the blue biotech and presence of high-tech centers on the national territory.



# The biotech application within the bioeconomy:



## Biotech for industry and environment

- There are 208 biotech companies operating in the industrial and environmental field, equal to 30% of the national total. They offer tools which optimize the transformation of biomass into eco-friendly bioproducts and third generation biofuels or to improve the performance and the environmental sustainability of the traditional productive processes.
- The turnover of the companies operating in the industrial and environmental field, exceeds 2 billion euros.
- Between 2014 and 2018, the growth rate of the intra-muros biotech R&D investments has been significantly fast in the industrial applications (+30%), especially involving those companies which are not biotech oriented: this comes as a confirmation of the biotech growing leading role in redefining and renovate the products and processes of several traditional industries.

# 1. Executive summary



## Biotech for Agriculture and environment

- The overview of the companies operating in the agricultural, veterinary and zootechnic field in Italy, appears to be diversified and takes into account 60 companies (9% of the total).
- The common goal of these companies lies with the use of molecular biology techniques for the progress and innovation of agriculture, livestock and food supply, in an efficient, safe and sustainable way.
- The turnover of the companies operating in the zootechnic and agricultural field, exceeds 850 million euros.
- 80% of companies operating in this field are classified as small or micro companies.
- Over half of these micro and small companies are dedicated to biotech R&D and among these, there is no record of medium to big companies.
- The share of the intra-muros biotech R&D investments on the biotech turnover for all those companies dedicated to biotech R&D, most of which are nationally controlled, exceeds 40%.



## 2 . The Italian biotech industry in figures

### Key figures of the Italian biotech...

	Total number of companies	Dedicated biotech R&D firms...	of which, nationally controlled dedicated biotech R&D firms
Number of firms*	696	365	344
Biotech turnover**	12,053,180	4,909,185	975,153
Total R&D investment***	2,262,564	531,741	242,392
Total biotech R&D investment***	777,534	490,063	231,385
Biotech employees**	13,313	6,087	4,176
Biotech R&D employees**	4,526	2,899	1,913

Values in thousands of euros €/000

\*Last available data, 2019 \*\*Last available data, 2018 \*Intra-muros and extra-muros total

- By the end of 2019, there are 696 biotech companies in Italy.
- The biotech turnover exceeds 12 billion euros, with an average annual increase of 5% between 2014 and 2018.
- There are more than 13 thousand biotech employees in Italy, 34% of which are involved in R&D activities.
- The total R&D investments of the companies taken into account, reach 2.3 billion while the biotech investment exceeds 770 million euro, with

a 7% growth with respect to the year 2016 and a 25% growth with respect to the year 2014.

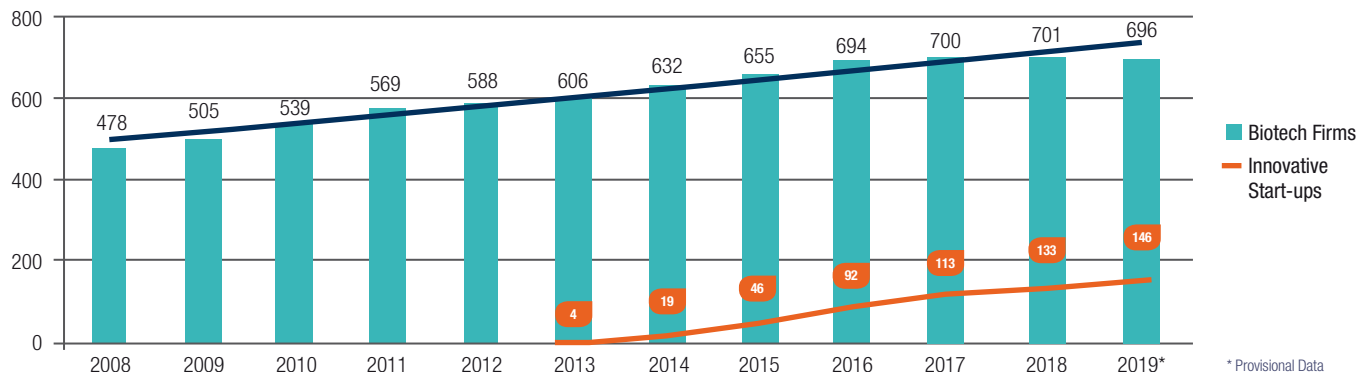
- With the biotech activities of domestically controlled dedicated R&D firms, the ratio of the R&D investments to the turnover is constantly stable above 20%<sup>1</sup>, with peaks exceeding 70% for the micro firms.

<sup>1</sup> Intra-muros biotech R&D investments/ biotech turnover



# ...tell us a story about a vital and dynamic industry

Number of biotech companies in Italy



- The biotech industry is vital and is showing a constant growth of the demographic dynamics on the national territory. The slight slowdown in the growth rate over the last 3 years is mainly due to the provisional nature of the last figures available. While for the traditional industrial field it is possible to make a precise mapping, based on the the NACE codes, for the biotech field, being a technology applied across the above mentioned fields, the lack of a specific corresponding NACE code for most of the companies requires a precise analysis of the national industrial sector through scouting activities. Moreover, regarding the newly born enterprises, the immediate listing is not that easy due to low visibility problems. This could be due to a functioning website being activated late, or by the lack of an available financial

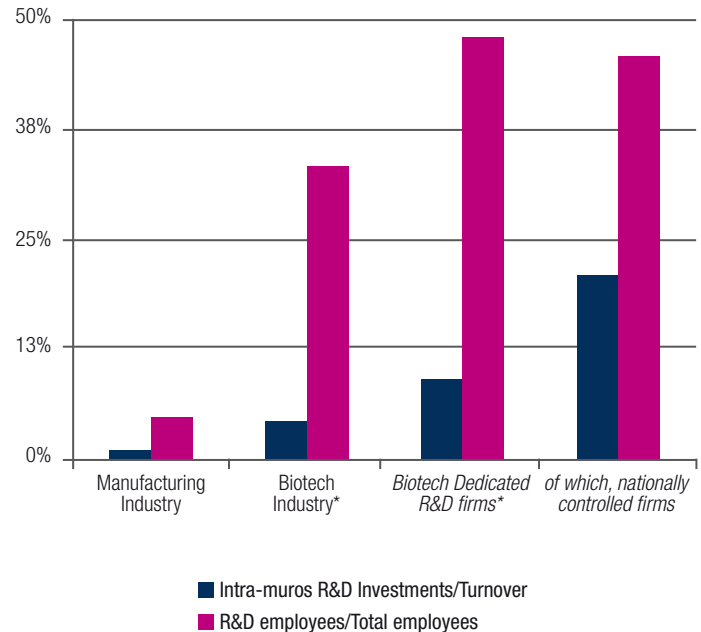
statement. There are many factors which lead to the counting of newly born enterprises, possible only after some years they have been actually created.

- The biotechnological Innovative start-ups, established at the end of the year 2012 thanks to the Decreto crescita “bis” (Second Growth Decree), a measure launched in order to favour youth employment and simplify the access to financial tools by new born companies which aim at innovation, have also shown a positive demographic dynamic. The particular business model of the biotech sector represents a niche field among the innovative start-ups, representing only 1.3% of the national companies. This is mostly due to the high costs of R&D activities and to the time-to-market which is on average longer when compared to other fields.

# Research & Development: strategic role for competitiveness

- The biotech research intensity, is way above average when compared to the overall Italian industry.
- Although the biotech industry makes up only 0.02% of the total national companies, its biotech R&D investments represent 3.4% of the total Italian business enterprise R&D investments.
- Compared to the manufacturing field, which is the sector with the largest contribution to the total business enterprise R&D, the ratio of the biotech R&D investments to the biotech turnover is considerably higher:
  - 4 times as much for the biotech companies in general;
  - 9 times as much for dedicated biotech R&D firms;
  - 20 times as much for nationally controlled dedicated biotech R&D firms.
- Likewise, there is a wide gap with reference to the R&D employees over the total number of employees in the manufacturing industry:
  - 7 times as much for biotech companies in general;
  - 10 times as much for dedicated biotech R&D firms.

R&D intensity



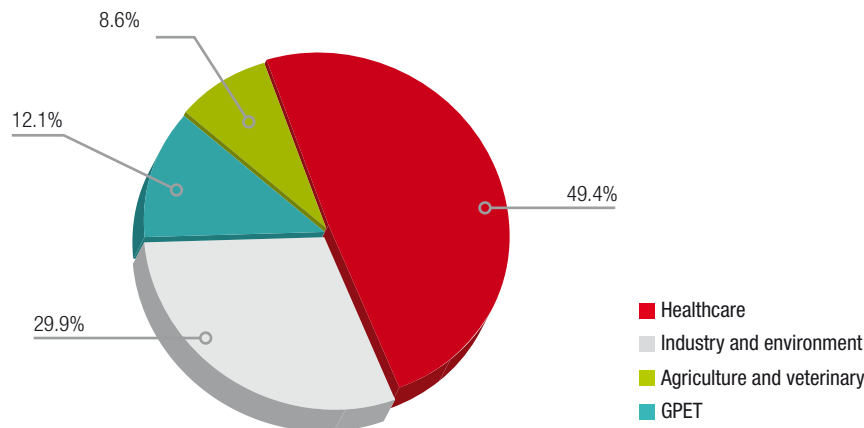
1. Only intra-muros R&D investments have been calculated

\* only year 2017 biotech activities

Source: for the manufacturing, based on ISTAT data processing, last available data 2017

# Active firms in all fields of application...

Analysis per field of application



- About half of the companies which have carried out R&D activities or biotech production in 2019 is mainly involved in human healthcare, which historically is the first field to have driven the development of the biotechnologies.
- 30% of the companies are focused on research projects aimed at producing industrial goods and services and mitigation measures for the environmental impact.
- Genomics, Proteomics and Enabling Technologies - GPET application field, appears in 12% of the companies taken into account, while the agricultural and zootechnical one amount to 9% of the companies.
- Same exact field distribution can be found among the innovative start-ups, which represent 20% of the total companies.

# ...moving towards a sustainable future, driven by a strong spirit of innovation

Classified according to their main activity:

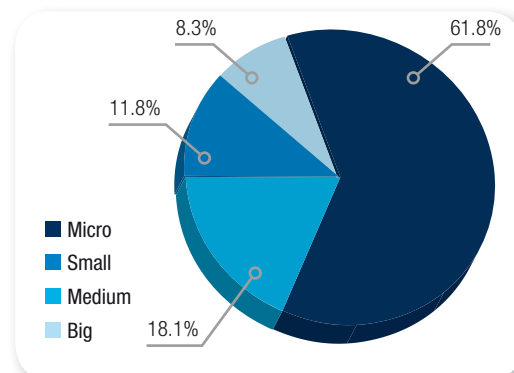
- Roughly half of the Italian biotech companies, 344 to be precise, are active in the healthcare industry, looking forward to innovative solutions in the medical and pharmaceutical fields. Biopharmaceuticals, diagnostics, vaccines: these are the three macro-areas of biotech application, in the human health industry, which supply extraordinary and innovative tools to treatments, therapies and preventing.
- There are 208 biotech companies operating in the industrial and environmental field. They offer tools which optimize the transformation of biomasses into eco-friendly bioproducts and third generation biofuels or to improve the performance and the environmental sustainability of the traditional productive processes.
- There are 60 biotech companies active within the agricultural and veterinary industry. This is a very important resource in order to face the challenges for an adequate nourishment in terms of quality and nutritional on a global scale.
- There are 84 companies working in the Genomics, Proteomics and Enabling Technologies field – GPET. They carry out basic research activities, which is a driving force for all biotech fields of application. From genes to proteins and up to biochips and bioinformatic technologies, we can observe a prevalence in the use of «omic» technologies (genomics, proteomics, transcriptomics, etc.) and in the Big Data analysis through bioinformatic approaches.



## 2. The Italian biotech industry in figures

### Biotech firms: size analysis

- 80% of the Italian biotech industry is made up of small and micro companies, which have been a driving force in the growing dynamics for the entire field.
- More than 50 new innovative start-ups, active in the biotech field, have been registered between 2017 and 2019.
- In the last five years (2014-2019) there has been an increase in the number of active SMEs in the biotech field, with an increase of almost 20% throughout this period. This event is partially related to merge & acquisition operations with which companies operating within traditional fields have acquired the activities and the biotech know-how from start-ups.
- The core of the medium and big size companies has essentially been stable in terms of absolute value, with a fluctuating share at around 12% for the medium size companies and with the big companies having a slightly shrinking share (8.3% in 2019).

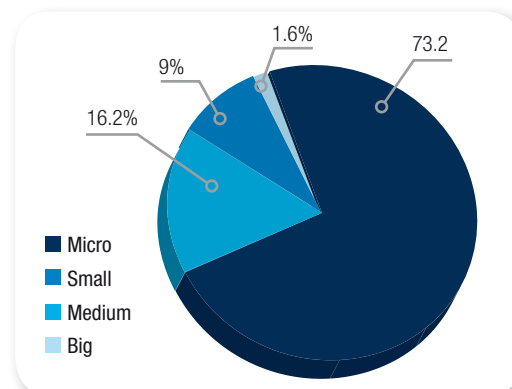


Micro: 1-9 employees  
Small: 10-49 employees  
Medium: 50-249 employees  
Big: 250+ employees

	2014	2015	2016	2017	2018	2019
Micro	62.5%	62.4%	63.8%	62.9%	61.6%	61.8%
Small	15.5%	16.2%	15.9%	16.6%	18.1%	18.1%
Medium	12.3%	12.2%	11.7%	11.9%	12.0%	11.8%
Big	9.7%	9.2%	8.6%	8.7%	8.3%	8.3%

## R&D dedicated firms: size analysis

- Among all the biotech companies R&D dedicated, the total share of micro and small companies is stable at 90%.
- The micro and small components represent a complementary dynamic. If the share of the micro companies decreases from 76% to 73% between 2014 and 2019, the share of the small sized companies increases from 14% to 16%.
- The share of the medium sized companies is increasing, reaching 9% of the total of all biotech companies dedicated to research activities.



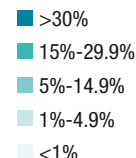
Micro: 1-9 employees  
 Small: 10-49 employees  
 Medium: 50-249 employees  
 Big: 250+ employees

	2014	2015	2016	2017	2018	2019
Micro	75.9%	74.6%	74.9%	75.1%	73.0%	73.2%
Small	14.1%	15.9%	15.4%	15.2%	16.4%	16.2%
Medium	8.2%	7.8%	8.0%	8.1%	9.0%	9.0%
Big	1.8%	1.7%	1.7%	1.6%	1.6%	1.6%

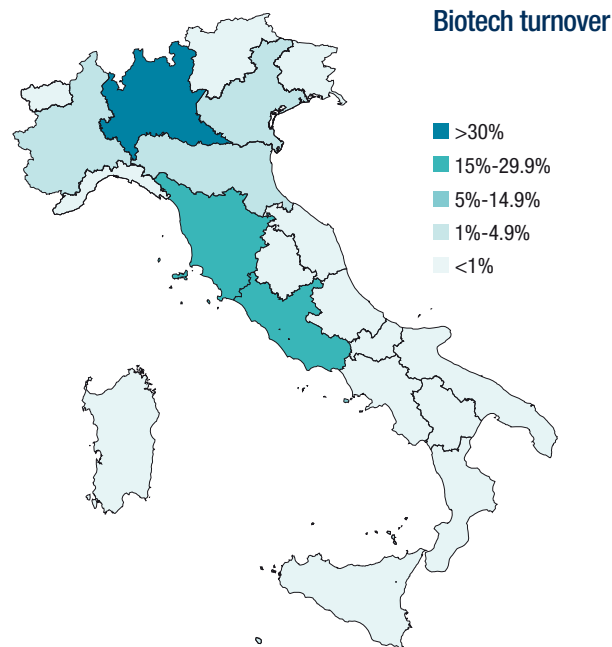
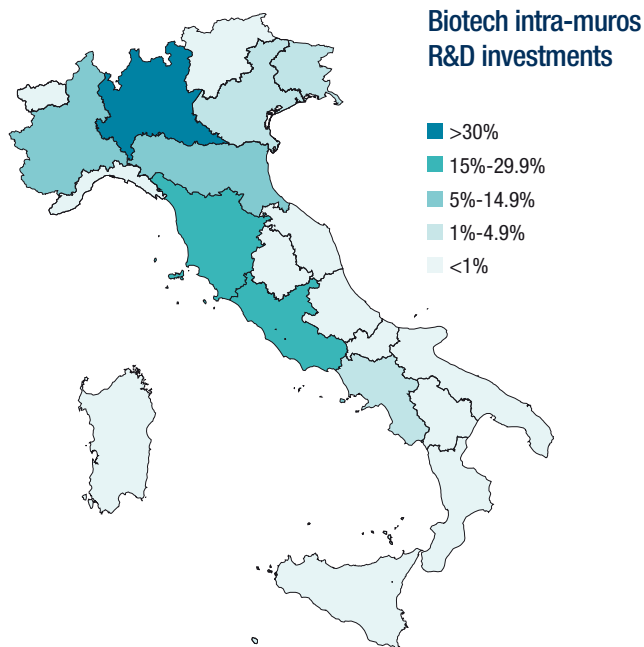
# Geographical distribution analysis

Region	Firms (by head office)		National biotech intra-muros R&D investment shares	National biotech intra-muros turnover shares
	Number	%		
Lombardy	195	27.8%	30.26%	45.32%
Lazio	65	9.3%	20.89%	22.41%
Veneto	62	8.8%	2.74%	3.25%
Emilia-Romagna	62	8.8%	5.67%	2.74%
Piedmont	56	8.0%	7.17%	3.74%
Campania	46	6.6%	4.49%	0.56%
Tuscany	44	6.3%	22.66%	19.45%
Friuli-Venezia Giulia	34	4.9%	1.65%	0.17%
Apulia	30	4.3%	0.17%	0.00%
Sicily	23	3.3%	0.9%	0.5%
Marche	18	2.6%	0.56%	0.16%
Trentino-Alto Adige	15	2.1%	0.84%	0.94%
Sardinia	14	2.0%	0.4%	0.00%
Liguria	9	1.3%	0.16%	0.04%
Calabria	8	1.1%	0.03%	0.00%
Umbria	7	1.0%	0.24%	0.02%
Abruzzo	6	0.9%	0.79%	0.03%
Other regions	7	1.0%	0.46%	0.66%

Number of firms 2019



## 2. The Italian biotech industry in figures



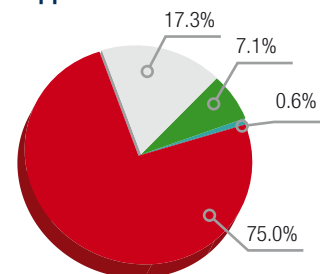
- In the last decade, the number of biotech companies has increased throughout the national territory. The growing share in southern Italy has been particularly significant, Campania region specifically, reaching 19.4% and 6.9% on the overall total in 2019 respectively.
- On the contrary, the turnover (98.3%) and the biotech R&D investments (93%) keep on being polarized within a restricted area, mainly concentrated in the center north of the country.
- Lombardy (45.3%), Latium (22.4%) and Tuscany (19%) lead the rank of regions with the highest biotech turnover. Placed second, right after Lombardy (30%), Tuscany has a biotech R&D share above 22%, approached by Latium only in the last few years.



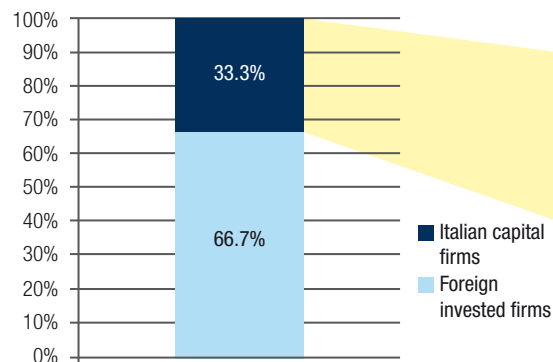
# Biotech turnover analysis

- Taking into consideration all companies, three quarters of the total biotech turnover is generated by the healthcare industry.
- Two thirds of the biotech turnover is generated by foreign controlled companies, which represent only 11% of the counted companies, specifically in the healthcare industry.
- The nationally controlled companies, on the other hand, generate more than half of the biotech turnover in the industrial and environmental fields of application, reinvigorating the traditional national industrial specialization in chemistry.

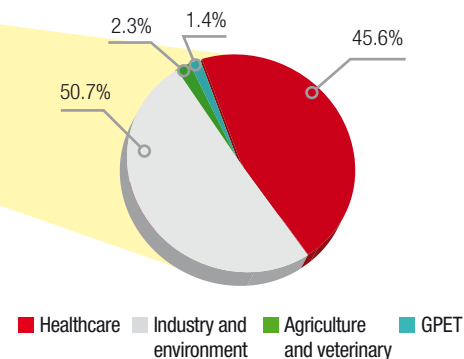
Total firms: breakdown of turnover by field of application



Total firms: biotech turnover distribution between companies with foreign and Italian capitals



Italian capital dedicated biotech R&D firms: breakdown of the turnover by field of application





### 3. R&D activities

## Research supporting competitiveness

- A moderate economic growth and a high level of the sovereign debts create conditions for the instability of the financial markets, which is more or less significant according to the country.
- The key to unlock and stimulate the cyclical recovery of the economy, is to sustain science and innovation through higher investments in research and development, as this tends to favour industrial competitiveness<sup>1</sup>.
- Research, training and industrial innovation represent, in an organic and virtuous combination, the capacity of a country to change and grow<sup>2</sup>. These are the basis for social and economic progress, indirectly contributing to the social well-being<sup>3</sup>.
- There is a positive relationship between R&D investment and growth. There is growing awareness in Italy that the innovation performance can strongly affect the national competitive outcome. From here, the necessity to implement specific actions drawn to favour this virtuous bond<sup>4</sup>.

1 M. Coccia, Technovation, 2012

2 L. Nicolais, G. Festinese, Ricerca e innovazione, 2006

3 ISTAT, Le 12 dimensioni del benessere – Ricerca e Innovazione

4 The European House - Ambrosetti, 2019

# Italy's positioning

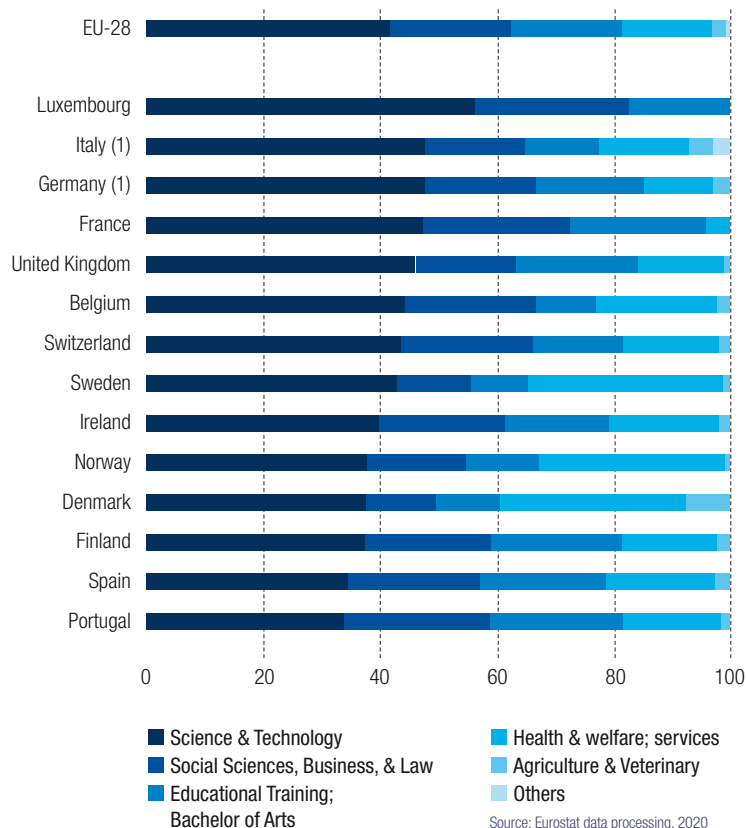
- An excellent level of research that is carried out with limited resources. These are the two elements which distinguish the Italian science industry.
- Given the high number of active PhD programmes in Science & Technology, Italy ranks second among European countries with reference to the training of personnel dedicated to R&D. This figure is way above the EU-28 average<sup>1</sup>, which indicates a very high potential.
- Moreover, the Italian researchers are well known for their excellence and they are among the most productive worldwide, in terms of scientific publications<sup>2</sup>. It is not surprising therefore that the Italian research is specialized in numerous biomedic fields.
- In February 2018, «Nature» pointed out the excellent scientific results of the Italian research, highlighting its growing contribution to the most cited scientific discoveries worldwide (10%).
- These performances are even more significant if we take into account the number of researchers in Italy, compared to the other main European countries<sup>3</sup>.

<sup>1</sup> Eurostat (online data code: educ\_uoe\_enrt03), data updated on 31.12.2019

<sup>2</sup> The European House - Ambrosetti, 2019

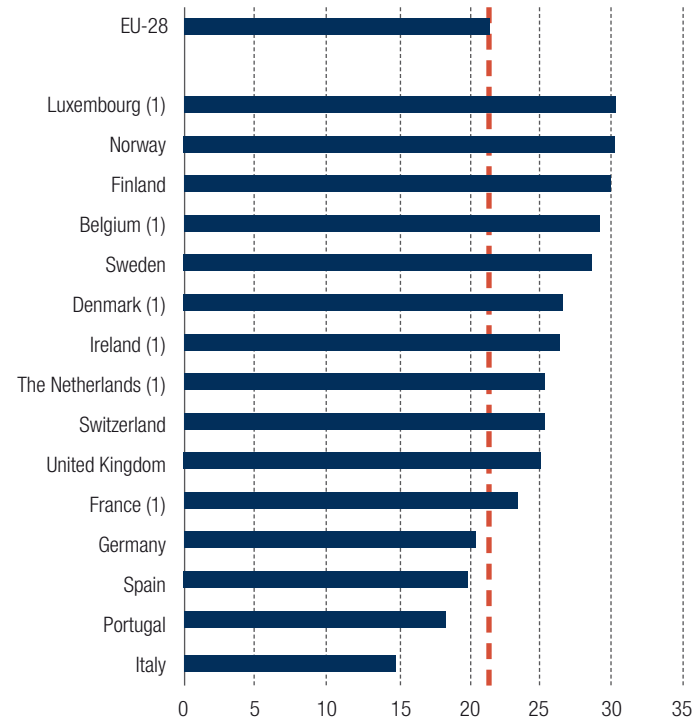
<sup>3</sup> Eurostat (online data code: rd\_p\_persocc), data updated on 31.12.20219

Percentage of students following a PhD per discipline field in 2017



### 3. R&D activities

#### Science-based employees with tertiary education, over the active population in 2017



Source: Eurostat data processing, 2020

- Less than 15% of the Italian work force is represented by people employed in a science-based sector having received a tertiary education<sup>1</sup>. This situation contributes to feed a strong phenomenon of brain drain.
- It is estimated that the brain drain involves 80.000 Italians, 25.000 of whom with a degree – mainly in STEM subjects (Science, Technology, Engineering and Mathematics) -, who take up a career outside of Italy<sup>2</sup>.
- This event, which does not have an adequate counterbalance of talents attraction from abroad, implicates a cost of 14 billion euros for the whole system, on a yearly basis. This figure corresponds to roughly 1% point of the national GDP, widening the gap with other countries<sup>2</sup>.
- For every resource exiting, the economic impact is estimated in a loss of 5,7 million euros due to the missed revenues. On the contrary, the benefit generated from a resource re-entry in terms of GDP, is roughly 10 million euros<sup>3</sup>.
- Pushing out qualified resources and not being able to adequately attract foreign scientists, significantly limits the Italian development capabilities.

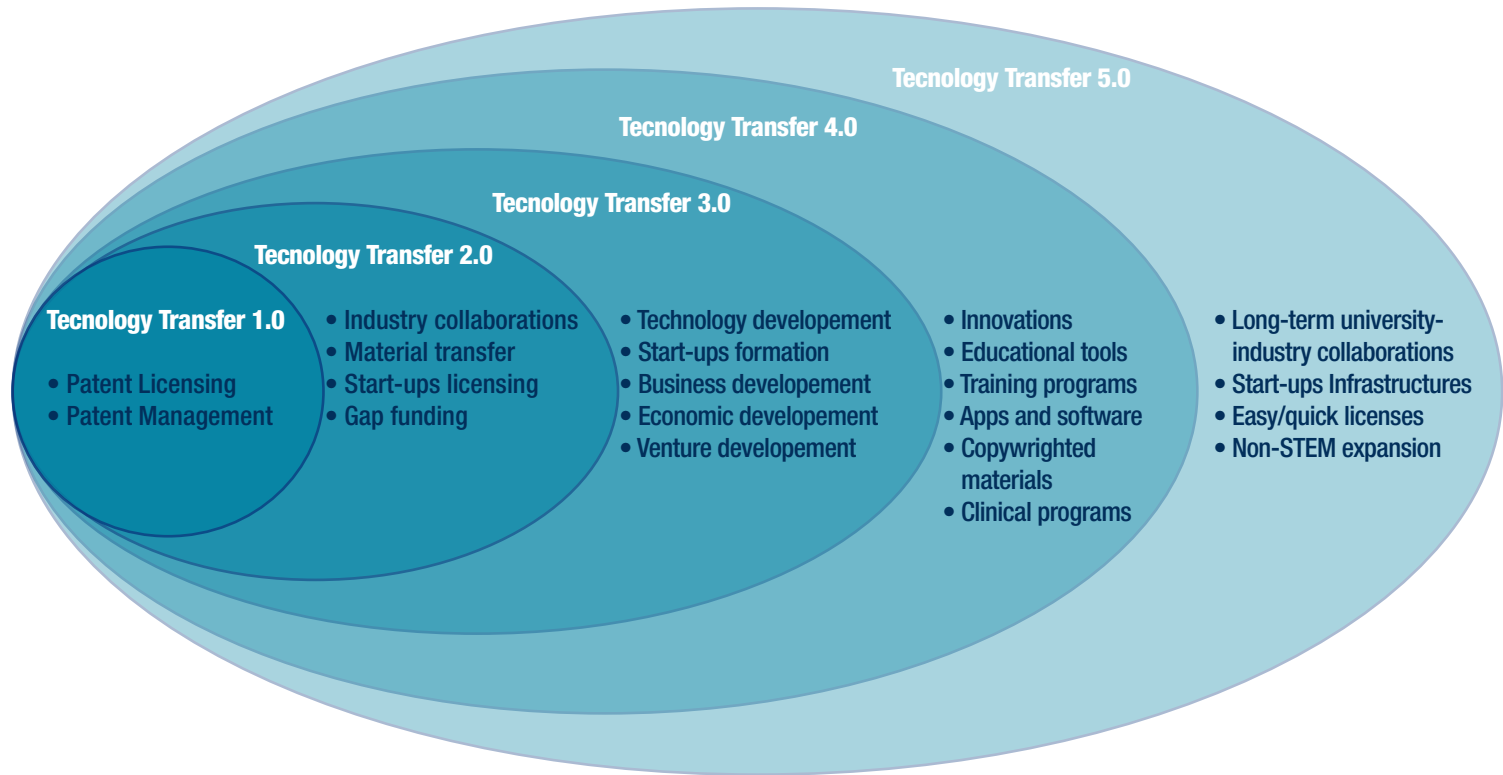
<sup>1</sup> Eurostat (online data code: hrst\_st\_ncat)

<sup>2</sup> <https://www.ilsole24ore.com/art/la-fuga-cervelli-costa-all-italia-14-miliardi-all-anno-ACphFIAB>

<sup>3</sup> Talents in motion data processing, 2020

## Tech Transfer

- Defined as the process of conveying results stemming from scientific and technological research to the market place and, therefore, to the society. Non può essere separata da punto dalle frasi precedenti altrimenti mancano del soggetto.
- It has been proven that innovation can have a significant economic impact in terms of revenue, new companies, jobs generated and in general, major well-being for the territory which hosts its development. On an international level, the competition between territories in the creation of qualifying conditions, which can facilitate the tech transfer process, is getting more intense.
- The tech transfer process has evolved and improved with time: we went from the organization of a set of activities aimed at safeguarding the intellectual property – Tech Transfer 1.0 – to the innovation dissemination – Tech Transfer 4.0 -. Not only activities aimed at licensings and patents coverage, but also the creation of solid programmes for the setting up of start-ups, derisking funds, public-private joints labs... up to the management of translational clinical research.
- The driving force of this evolution has been the investments made by the public institutions in staff training and in the creation of multidisciplinary teams, with scientific, marketing and legal backgrounds.
- The scientific progress is unstoppable and in the most advanced countries a Tech Transfer 5.0 system is already taking shape: a system based on new business models, in partnerships with academies, companies and investors, which can also explore innovation in non-scientific fields.

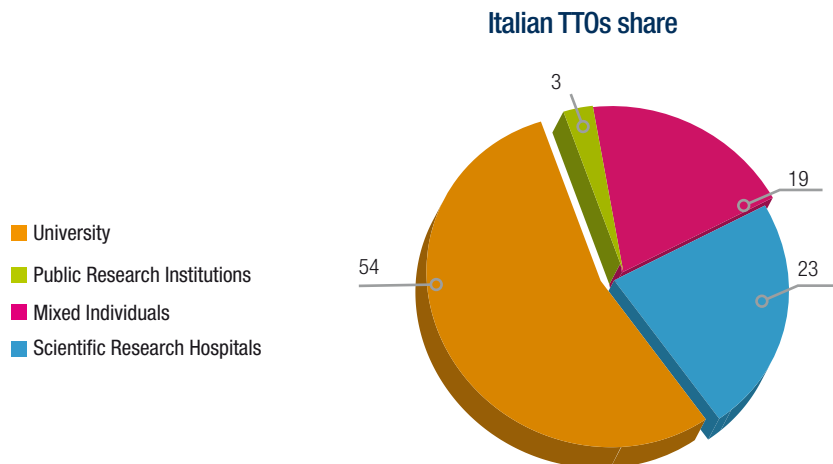


Source: Arundeeep S. Pradhan Processing ,  
The evolution of Technology Transfer, Apio Innovation, 2016



## The Italian Tech Transfer Offices: TTOs development with the Knowledge Transfer Manager and Innovation Promoter

- According to the latest data available, Italy can count on a network of Technology Transfer Offices (TTOs) which are dedicated to Life Science<sup>1</sup> and structured with a total of 99 TTOs, 54 of which belong to Universities, 23 to Scientific Research Hospitals, 3 to the National Public Research Institutes<sup>2</sup>, and the remaining 19 belonging to mixed individuals<sup>3</sup>.
- The task to promote the merger between the academic and the industrial worlds, encouraging the entrepreneurial culture, is something that regards all TTOs.



- 1 Source: CNR Triennial Plan 2001 – 2003 - Life Science Field includes all branches referring to the study of matter and living beings, from basic to advanced organisms, from man, to animals, to plants.
- 2 National Research Council (CNR), Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), Council for Agricultural Research and Agricultural Economics Analysis (CREA)
- 3 The European House Ambrosetti data processing, and updated 2020 websites

- Despite the commitment and dedication by the national TTOs, they have a great disadvantage in terms of resources and personnel. For every unit there is an average of 4.2 active people in charge of the knowledge transfer while abroad, in similar units, there are 8.5 active people<sup>1</sup>.
- It is for this reason that Italy, realizing the need to fill this gap, has finally decided to undertake some important steps towards the innovation policy, investing in order to strengthen the technology transfer activities and promoting the relationship between research and markets.
- Specifically, several calls and initiatives have been launched in order to facilitate meetings between researchers and companies, bring research developments a stage closer to the industrial application and train new specific figures such as the innovation managers.

Among the several initiatives we list the following:

- **Innovation Package (Mise)**

A set of actions and instruments for micro, small and medium companies, with the aim of driving the innovation and the technology transfer. The package includes the following measures: National Innovation Fund – to access the financial resources for industrial invention patents-, Patents+, Trademarks+, Designs+.

[bit.ly/Mise\\_InnovationPackage](http://bit.ly/Mise_InnovationPackage)

- **Grant for Tech Transfer Offices (Mise)**

Grant issued to finance capacity building development projects of the Tech Transfer Offices (TTOs) of the Italian universities and Italian public research institutions, with the aim of increasing the tech transfer flow towards the business field. Refinancing already assisted projects and financing new ones.

[https://bit.ly/Mise\\_PotenziamentoUTT](https://bit.ly/Mise_PotenziamentoUTT)

1. The European House data processing - Ambrosetti, 2019



### 3. R&D activities

- **Grant for the patent promotion through proof of concept projects (Mise)**

Grant issued to develop patents promoting programs by financing proof of concept (poc) projects.

[https://bit.ly/Mise\\_ValorizzazioneBrevetti](https://bit.ly/Mise_ValorizzazioneBrevetti)

- **Knowledgeshare (Italian Patent and Trademark Office)**

A platform for a clear, legible and intuitive presentation of academic inventions which could interest the industrial field.

<https://www.knowledge-share.eu/>

- **Knowledge Exchange Program (ENEA)**

Following the example of international best practices for technological transfer, the Program aims at narrowing the gap between public research and business within an open innovation approach. A cooperation path with the industrial system, which can stimulate a multidirectional knowledge exchange and can produce and develop new products and processes.

<https://www.kep.enea.it/>

- **Proof of Concept (ENEA)**

A programme provided with 2,5 million euros to prove, in cooperation with industrial partners, the technological feasibility and the commercial potential scaling-up technologies developed within ENEA laboratories. The industrial partners will have a pre-emption or option rights, based on the results obtained from these projects.

<http://industria.enea.it/proof-of-concept>

# Science Parks, incubators and accelerators to sustain new entrepreneurship

- The Italian territory is scattered with numerous professional structures which help sustain the new entrepreneurship: Science Parks, Incubators and Accelerators.
- The Science Park is an organization managed by specialized professionals, whose aim is the promotion of the cultural innovation and competitiveness of the associates' entrepreneurial initiatives. In order to reach this goal, a science park stimulates and manages technological and know-how flow between universities, research institutes, companies and the market; it facilitates the creation and the development of companies, based on innovation through incubation and spin-off processes; it provides high value services, premises and facilities<sup>1</sup>.
- The incubator is an organization which actively supports the creation and development process of new innovative companies through a range of services and resources, offered both directly and indirectly through a network of partners<sup>2</sup>.

gh a network of partners<sup>2</sup>.

- The accelerator is a programme intended to accelerate the development of new start-ups; a sort of 'intensive' incubator, which gets you ready for the open innovations and/or fundraising.
- To date, 32 Science Parks<sup>3</sup> and 197 between Incubators e Accelerators<sup>4</sup> have been counted. Thirteen of these organizations carry out activities as Science Parks, Incubators and Accelerators.
- Despite representing organizations with different legal structures and objectives, science parks, incubators and accelerators often overlap each other.
- There is a total of 37 structures which host biotech companies (8 Parks, 20 Incubators and 9 divalent structures), for a total of 112 companies: 23 are located within the parks, 50 within the incubators and 39 within the divalent structures.

## Science Parks (8)



23



firms

## Incubators (20)



Biotech firms

## Divalent structures (9)



30



Biotech firms

- 1 International Association of Science Parks
- 2 Aernoudt, R. Incubators: Tool for Entrepreneurship? Small Business Economics 23, 127–135, 2004
- 3 EconomyUp last available data processing, Registry of businesses, APSTI, 2020
- 4 Social Innovation Monitor 2019, "Italian incubators/accelerators impact - Public Report 2019", <https://socialinnovationmonitor.com/report-incubatori/>

## Territorial specialization

- Analysing the activities of the Italian companies, together with the patents subject area held on a territorial level by private and public organizations, proper technological specialized areas have been outlined. Geographical areas within which an aptitude towards the biotech R&D activities emerge.

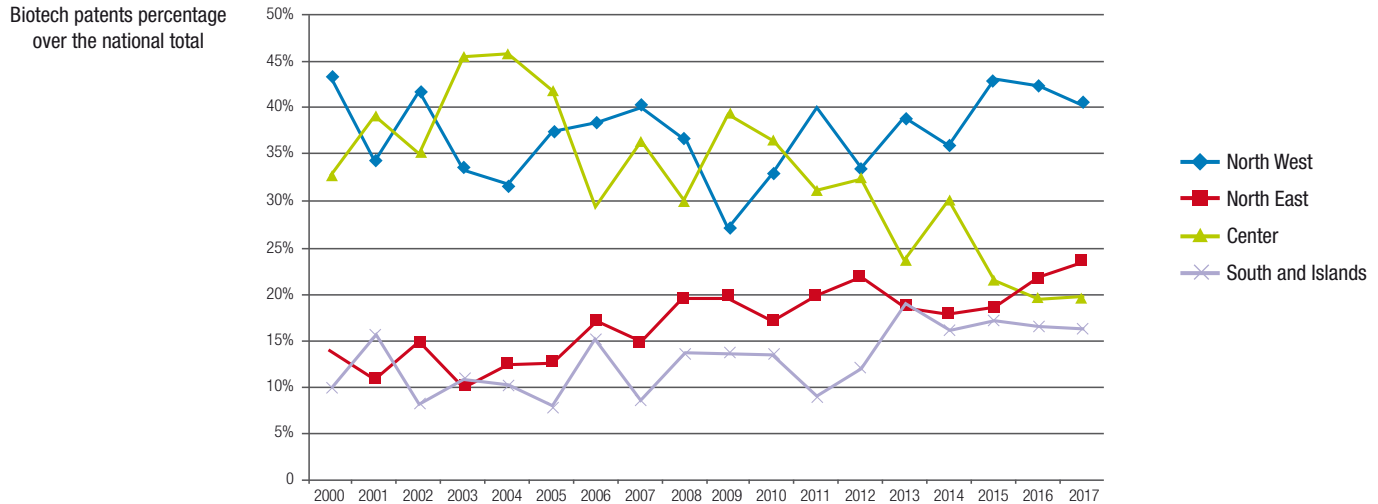
## Patent Analysis

- To evaluate the innovation capacity expressed by the main national territorial areas, the international biotech patents (PCT) produced between the year 2000 and 2015<sup>1</sup> have been analyzed, with a view on the year 2016 and 2017.
- The patent production analysis has seen the north western territories and central Italy very active since the year 2000, due to the predominance effect of the pharmaceutical industry within these regions. Pharmaceutical field which was first to help developing the biotech technologies. However, the two territories have shown a very different development. The north western territories reinforce the intellectual properties production within the biotech field, exceeding 40% in the last few years. This means 2 out of 5 patents are produced within this field. Central Italy, on the other hand, has recently shown a reduction reaching 20%.
- The north eastern territories, southern Italy and the Islands distinguish themselves for a residual biotechnological patent activity. Activities which tend to spread out with time, due to the biotech expansion over to new fields of application. Starting from 2014, we can observe a stagnation in the southern regions, which goes hand in hand with the tightening of the number of dedicated biotech R&D firms, as observed by other studies<sup>2</sup>. The rise of the north eastern regions share in the overall biotech patents continues even beyond 2014, nearing 25% in 2017.

<sup>1</sup> OCSE, regional data on Research and Innovation 2020.

<sup>2</sup> Svimetz Report, 2019.

#### Territorial dynamics of the biotech patents production



Source: OCSE, regional data on Research and Innovation 2020

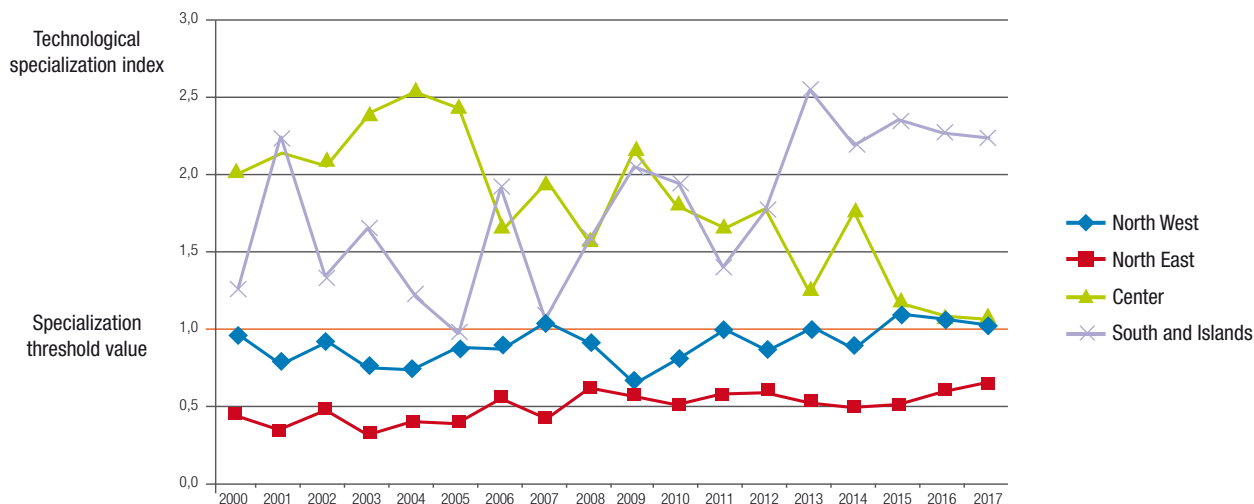
- The territorial technological specialization, expressed as a ratio between the percentage of registered biotech patents within the territory against the overall amount of patents registered within the same territory and the percentage of overall patents registered within a territory against the national total, highlights the huge progress made by southern Italy and the islands.
- The slow and constant increase of the biotech patents production, corresponded to an increased specialization within the same field, driven by the recent impulse given by the bioeconomic field of southern Italy<sup>1</sup> and by an increase of spin-offs created starting from 2008.

1. Bioeconomy in Europe, V Report. Intesa Sanpaolo Bank, Assobiotech, 2019



### 3. R&D activities

#### Territorial dynamics of the biotech specialization



Source: OCSE, regional data on Research and Innovation 2020

The international economic situation and the exacerbation of the crisis at the end of the century, together with the lack of forward-looking policies in sustaining research activities, has put these dynamics to the test, as indicated by the data starting from 2014.

- Also the central territories appear to be specialized, despite a decrease in these dynamics in parallel to a major refocusing towards other fields, among which the ICTs.
- In the northern territories, historically active on several fields, there does not appear to be any specific focusing, even though there is a growing uptrend in the technological specialization in the north western territories.

### 3. R&D activities

- Patents, trademarks and designs are intangible assets which are crucial factors for companies, in order to obtain a competitive advantage on the long run, with important effects on the territorial economies. An adequate amount of patents can start a virtuous circle which includes innovation, productivity, growth and qualified employment.
- Companies which intensively use trademarks and patents, alone contribute for 46.9% of the national GDP<sup>1</sup>.
- Companies which request a patent, trademark or design, have 21% more chance to increase their revenues compared to others<sup>2</sup>.
- Companies which intensively use trademarks and patents generate 1 out of 3 jobs in Italy, for a total of approximately 7 million job places<sup>3</sup>.

1 EPO-EUIPO, 2019

2. *Ibid.*

3. *Ibid.*

## Analysis of technological areas and application sectors

The analysis of the scientific and productive activities of the companies scattered on the national territory, shows that specific technical and technological skills are highly polarised in certain geographical areas.

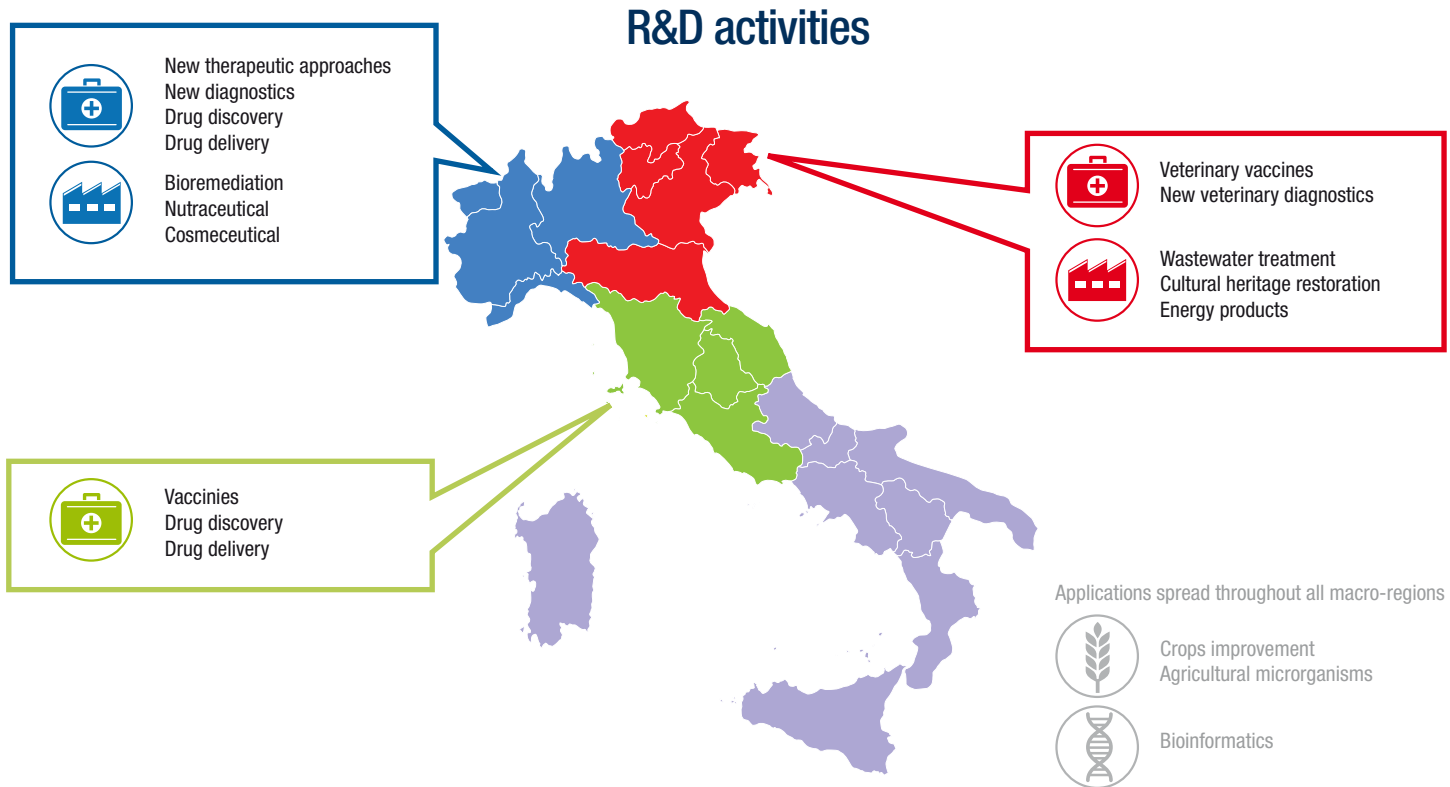
In some cases, on the same territory, we have science-based companies which are very close to each other but differ in size, just next to universities, research centers, science parks and incubators: different institutions which focus on the same technologies.

The operations within fields of high innovation potentials, besides the presence of competitive and cooperative elements within the same economic arena, highlight the profile of proper technological clusters at different development stages.

### Human healthcare

- The skills linked to the development of new therapeutic approaches and diagnostics appear to be concentrated in the north western area of the country, driven by Lombardy's small biotech valley which develops 43% of the national therapeutic research projects and 38% of the molecular diagnostic projects.
- The drug discovery and drug delivery activities on the other hand, are equally distributed between the north western area (37%) and center Italy (33%), the latter driven by Lazio's bioscience district.
- The development of human prophylactic products is the prerogative in center Italy: roughly 60% of the companies which develop vaccines are located in Tuscany and Lazio. Tuscany holds a worldwide recognized hub, thanks to the presence of a strong scientific tradition within the immunology field in this territory. Lazio on the other hand, shows more specialized skills shared among smaller companies.

## Geographic specialization within the main application fields



### Veterinary field of application

- It is the north eastern area which appears to have more sector-based skills, counting on half of the national companies which take care of both animal vaccines and veterinary diagnostics.

### Agricultural field of application

- With reference to the agricultural biotech (the use of microorganisms for an eco-friendly agriculture, genetic improvement of plant cultivation, seeds and floral varieties), breeding and related diagnostic, there is no territorial specialization among the four national macro-regions. It appears there is a geographical distribution of the activities firms which reflects the weight of the various biotech industries.

### Industrial and environmental field of application

- The area which has the highest specialization in the environmental applications, in terms of active firms, is again the north eastern region. These are specific activities by means of enzymes or microbial strains, for the treatment of urban or industrial wastewater, for the cultural heritage restoration or for the production improvement and energetic products performance (biogas, bioethanol and biodiesel), obtained through fermentative means.
- The bioremediation activities, an environmental decontamination process based on the microbotic metabolism, is an exception and appears to be concentrated in the north western area.
- The industrial applications which are based on the usage of bioactive substances, used as nutritious ingredient for nutraceuticals, or as active ingredients to obtain medical and cosmetic benefits for cosmeceuticals, sees northern Italy with 70% of the national ongoing projects.

### Bioinformatics

- The bioinformatics applications, aiming at identifying molecular information by means of IT assistance, appears to be equally distributed throughout the country.

On the basis of the main technologies with which the OECD (Organization for Economic Co-operation and Development) defines biotechnology, the technological priorities of the different national areas have been identified.

- While the north east and the north western areas resort to technologies related to the use of nucleic acids, such as genetic engineering and the study of genetic profiles, center Italy, the south and the islands appear to be more focused on proteins and other biomolecules, both for R&D activities and in the application for the production of goods and services.
- Center Italy also stands out compared to the rest of the country, for the great effort in the fine-tuning of genetic vectors and in the study of synthetic biology.

#### MAIN TECHNOLOGIES DEFINED BY OECD

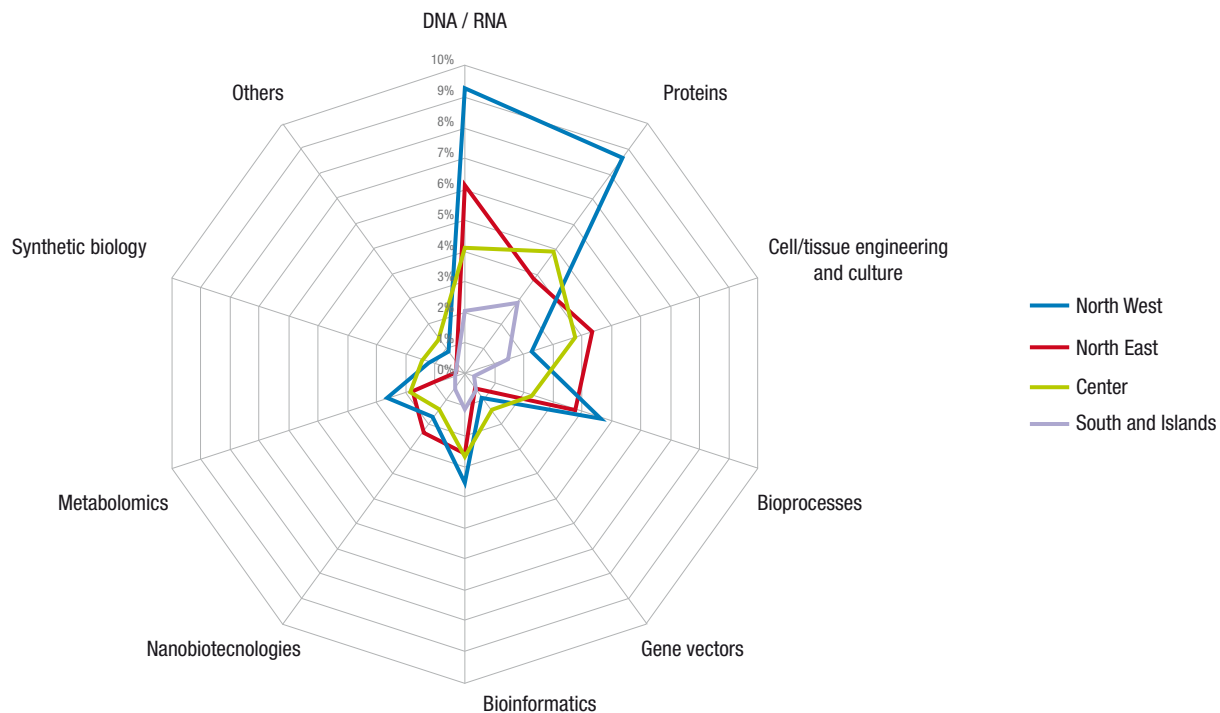
1. DNA/RNA: genomics, pharmacogenomics, gene probes, genetic engineering, sequencing/synthesis/DNA/RNA amplification, gene expression profiling and antisense technology use, gene- and genome- editing, gene-drive
2. Proteins and other molecules: sequencing /synthesis / proteins and peptides engineering (including large molecules hormones); new methods for large molecule drugs somministration; proteomics, protein isolation and purification, cellular receptor/signalling identification
3. Cell and tissue culture and engineering: cellular/tissue culture, tissue engineering (including tissue scaffolds and biomedical engineering), cell fusion, vaccines/immunostimulants, embryonic manipulation, selective technologies markers assisted, metabolic engineering, xenobiology, biopharming
4. Bioprocess techniques: fermentation by means of bioreactors, biorefinery, biotransformation, bioleaching, biopulping, biobleaching, biodesulfurization, bioremediation, biosensing, biofiltration, phytoremediation, molecular aquaculture
5. Gene vector or RNA vector: gene therapy, viral vectors
6. Bioinformatics: development of genome database, protein sequences, computer modeling of complex biological processes, computational design
7. Nanobiotechnology: diagnostics
8. Metabolomics/metabonomics: metabolites and their interactions, identification and analysis
9. Synthetic biology: standard biological parts production, protocells, in vitro DNA synthesis
10. Others





## Territorial qualifications within the main technological areas

R&D activities



# R&D investments analysis

	Total Companies	Dedicated biotech R&D firms	...of which, nationally controlled dedicated biotech R&D firms
Total <i>intra-muros</i> investments	1,710,545	445,710	200,841
Biotech <i>intra-muros</i> investments	532,475	435,012	195,023
Total <i>extra-muros</i> investments	552,019	86,032	41,551
Biotech <i>extra-muros</i> investments	245,050	55,051	36,362
Total investments	2,262,564	531,741	242,392
Total Biotech investments	777,524	490,063	231,385

Values in thousands of euros €/000 – 2018 Investments

- The biotech R&D investments represent 34% of the overall R&D investments, of the total companies analyzed. Data which increase to 92% for the dedicated biotech R&D firms and 96% among the nationally controlled companies.
- The total biotech R&D spending is roughly 778 million euros, with a 25% increase compared to 2014.
- With 435 million euros, the dedicated biotech R&D firms contribute for 82% of the total Italian intra-muros R&D investments.

## R&D investments per field of application

	Healthcare		Industrial & Environmental		Agriculture & Veterinary		GPET	
	Total firms	Biotech R&D dedicated firms	Total firms	Biotech R&D dedicated firms	Total firms	Biotech R&D dedicated firms	Total firms	Biotech R&D dedicated firms
Total intra-muros investments	1,404,417	417,729	223,723	13,946	49,562	7,148	32,843	6,886
Biotech intra-muros investments	468,723	408,034	37,017	13,096	14,983	7,064	11,752	6,818
Total extra-muros investments	481,452	84,340	58,852	372	10,599	707	1,117	612
Biotech extra-muros investments	241,566	54,041	1,287	221	1,598	417	600	372
Total investments	1,885,869	502,069	282,575	14,318	60,161	7,855	33,960	7,498
Total biotech investments	710,289	462,075	38,304	13,317	16,581	7,481	12,352	7,190

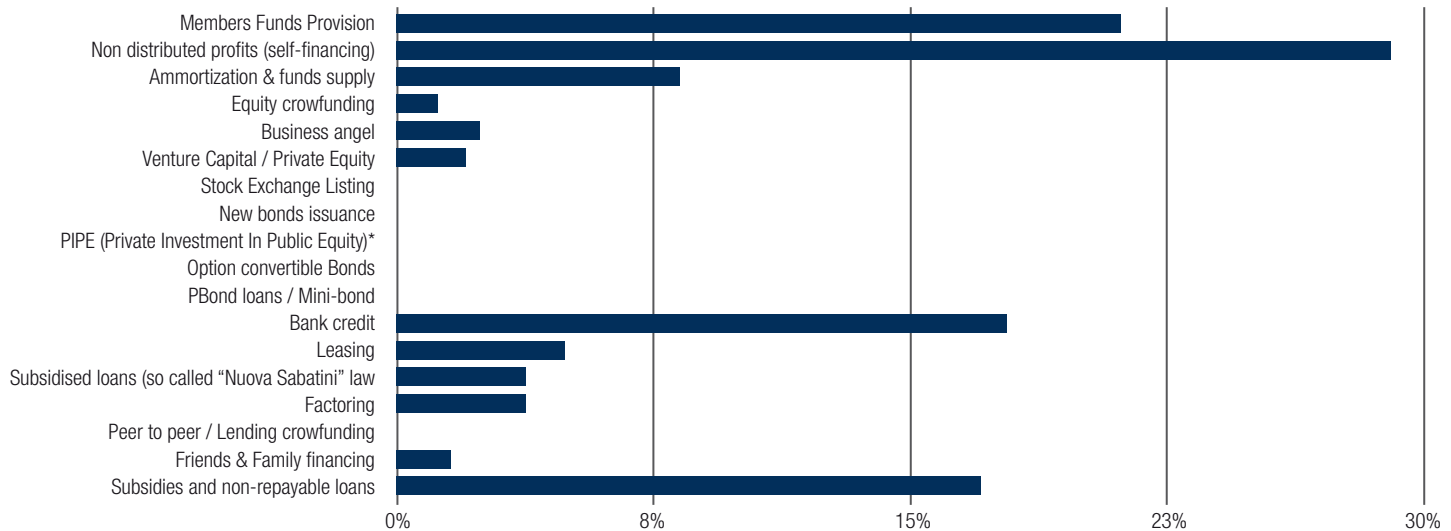
Values in thousands of euros €/000 – 2018 Investments

- 92% of the total biotech R&D investments are within the healthcare industry
- Between 2014 and 2018, the intra-muros biotech R&D investments increase has grown strongly especially for the industrial (+30%) and

for agriculture applications (+50%), involving in particular non biotech firms.

- The intra-muros expenditure exceeds 90% of the total investments for all fields, except for the healthcare industry.

# Financial sources



Total firms: Analysis of financial resources resorted to in 2017 and 2018 (data observed from questionnaires)

- As with all the Italian firms, the main financial resources for the biotech firms are self-financing and bank loans.
- Given the high number of research activities in this industry, a major role is played by subsidies and by non-repayable loans, specifically for research projects.
- Significantly important is the resort to innovative financial channels such as equity crowdfunding (a tool designed for the innovative start-ups thanks to the 2012 Second Growth Decree), Business Angels (from 0.9% to 2.4%) and Venture Capital Funds (from 0.4% to 2.1%).



## Venture capital investments

- Despite several uncertainties, such as the recent Brexit and the ongoing debate on medical drugs prices, the investments growth in the European biotechnologies has not decreased. On the contrary, the input of capitals on the European ecosystem, has seen new investments record for the third year in a row, which came close to 7 billion euros<sup>1</sup> in 2019. The Private Equity component has recorded another record performance with 175 transactions for a total amount of over 3 billion euros<sup>2</sup>.
- In general, 2019 can be distinguished by the presence of favourable development signals such as the attraction of foreign capitals, the presence of corporate operators and some relatively big investment rounds. Among these, Philogen's 63 million euros fundraising stands out, falling under the 2019 top ten European venture investments.
- With a total investment of 7.2 million euros, with 160 million euros<sup>3</sup> for the biotech industry alone in 2019, the national venture capital market still sees Italy far away compared with other main European countries.

<sup>1</sup> BioWorld, 2020

<sup>2</sup> KPMG data processing, Pharma & Biotech field, 2020

<sup>3</sup> AIFI data processing, VeM, BioWorld, 2020

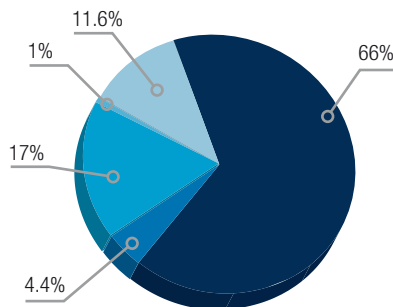
### 3. R&D activities

- In Italy, 25 financial operations have been recorded by the end of 2019, for a total of 152 million euros. These operations have placed our country as the recipient of 5% of the European investments and 1% of the global investments<sup>1</sup>. These capitals contribution have financed numerous deals: 14% of which European and 2% of which global<sup>2</sup>.
- 84% of the operations have been in favour of high-tech considered biotech firms, placing the whole industry at the top in technological terms, also when compared to ICT (47%) and the Medical field (67%)<sup>3</sup>.
- The average investment in the biotech sector, which stands at around 6 million euros, is undersized compared with the European average

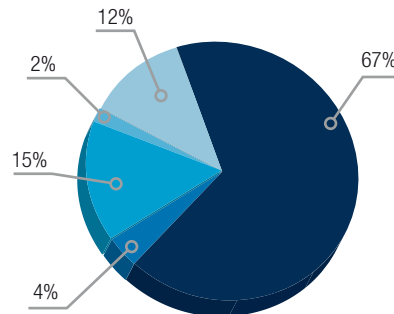
(20 million euros), even though, as previously mentioned, we have seen some relatively big investments taking place.

- The ongoing medical emergency related to the Coronavirus Sars-CoV-2 pandemic, has initiated numerous financial mechanisms concerning the opening of extraordinary international grants. A true call to arms for all companies and research institutes, which are active in the fine-tuning of ultra-fast diagnostics, antiviral therapies and other molecular therapies. On the basis of the ongoing global health scenario, it is safe to expect an increase of the private resources intended to finance all those companies with significant innovations.

Biotech VC investment shares



Biotech VC operation shares



<sup>1</sup> AIFI data processing, VeM, BioWorld, 2020

<sup>2</sup> AIFI data processing, VeM, BioWorld and KPMG, 2020

<sup>3</sup> AIFI, 2020

Source: data processing on AIFI, VeM, BioWorld and KPMG, 2020



## 4. Healthcare

### A full picture of the companies involved in Healthcare

	Total firms	Dedicated biotech R&D firms...	...of which, Italian capital dedicated biotech R&D firms
Number of firms*	344	208	193
Biotech turnover**	9,030,138	4,616,740	696,838
R&D investments***	1,885,869	502,070	215,391
Biotech R&D investments***	710,289	462,075	205,918
Biotech employees**	8,897	5,037	3,184
Biotech R&D employees**	3,409	2,398	1,427

Value in thousands of euros €/000

\* Latest data available, 2019, \*\* Latest data available, 2018, \*\*\*Total Intra-muros & extra-muros

- The total turnover from biotech activities performed by firms operating within the healthcare industry, exceeds 9 billion euros.
- The human health biotech applications generate 75% of the turnover and contribute for 91% of the R&D investments in the industry, employing ¾ of the Italian biotech R&D employees.

## Scientific innovations, medical innovations

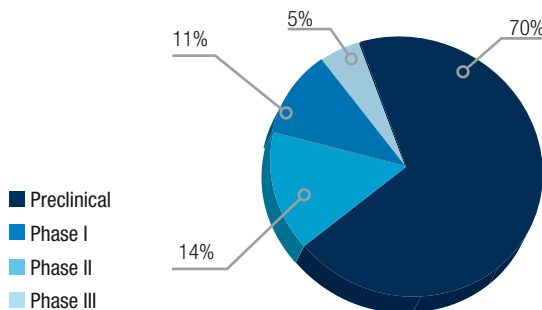
- The scientific evolution is an unstoppable process. Each single evolutionary step goes hand to hand with revolutionary effects on the healthcare system. In less than 40 years, the biotech applications went from a «simple» replication of the natural cellular mechanisms for the production of therapeutic proteins, to tissue engineering, «surgical» correction of diseases written in the DNA and to the fine-tuning of ultra fast diagnostics which use artificial intelligence. By mixing the different know-how, which intertwine and contaminate each other, the most promising applications are created, which will take shape in the years to come: big-data, artificial intelligence, machines learning, 3D printers and instruments which will be able to intervene in several medical fields such as personalized, precision and general medicine.
- The Italian firms whose predominant application of biotechnology is in the human healthcare are 344. On the overall Italian biotech companies, 199 develop diagnostic products and services for human healthcare. The firms which invest at least 75% of their intra-muros research budget in biotech research (dedicated biotech R&D firms), 92% of which are nationally controlled firms, are mostly related to the academic research field. This comes to show how the biotech world has opened new opportunities in Italy as well, referring to early-stage research related to the pharmaceutical industry, which unfortunately lacks the presence of large research centers and big multinationals.
- The effects of the intra-muros R&D investments over the biotech turnover, for the nationally controlled dedicated biotech R&D firms, nears on average 24.5%.

# Therapeutics: focus on the Italian pipeline

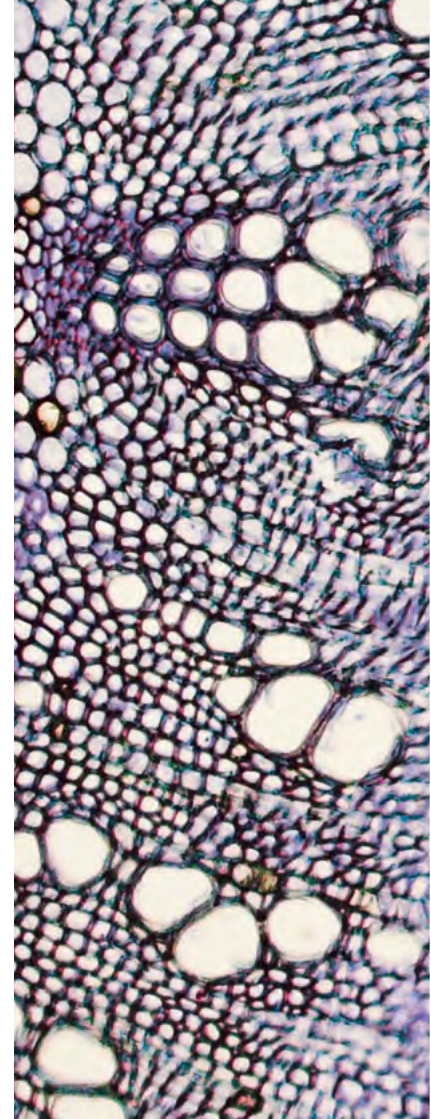
- There are 375 new therapeutic projects undergoing studies in Italy. 131 of these are in the discovery phase, as observed from the data collected from 106 Italian capital firms\*, through companies' websites and through questionnaires on developing products.
- Of the remaining 244, 171 are undergoing the preclinical phase and 73 are in the clinical phase (14% in Phase I, 11% in Phase II e 5% in Phase III).
- With regards to the previous analysis, 120 new studies have been surveyed. Unfortunately, 53 projects have exited the Italian pipeline, 49 of which were due to a strategic change by the companies which were developing them while the remaining ,4 have been licensed out.

Phase	Number of projects
Discovery	131
Preclinical	171
Phase I	33
Phase II	28
Phase III	12
<b>Total</b>	<b>375</b>

Products analysis by developing phase



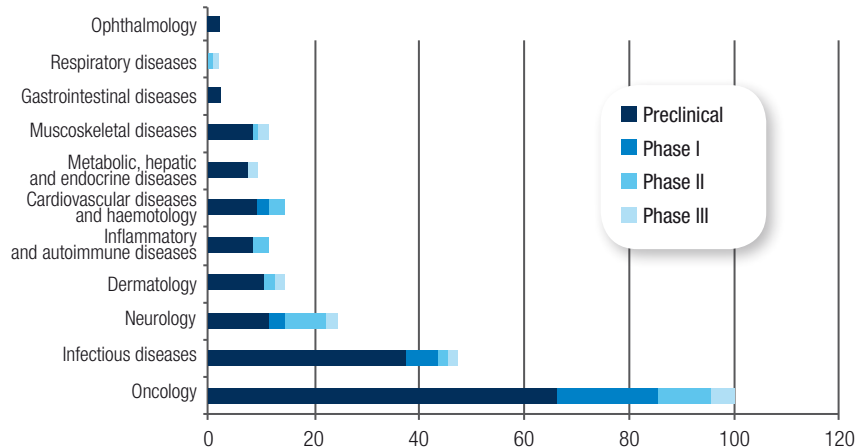
\* Only Italian capital firms have been considered. The number of products is to be considered as partial with regards to the total number of biotech products developed in Italy.



# Therapeutical areas of strategic interest

- The national interest in biotech research, is primarily focused on developing therapeutical solutions for oncological cases. Oncological illness is currently placed second among the major causes for death in 2019, with approximately 180,000 deaths<sup>1</sup>, just after the cardiovascular diseases (approximately 233,000 deaths).  
2019 has seen a growth in products which are currently being tested and developed for infectious diseases. In recent years, this field has seen a major interest and has recorded a growth in terms of investments from various companies.
- Commitments and investments in the infectious diseases field have been confirmed during the first quarter of 2020. The biotech contribution to the common mobilisation phase, to tackle the coronavirus Sars-CoV-2 is crucial: for genetic sequencing of the virus, to identify the pathology main receptor, for diagnosis and for the development of vaccines which can prevent the infection. Not to mention the research of an efficient therapy through the use of antiviral drugs and the testing of new monoclonal antibodies for prophylactic and therapeutical purposes. The Italian biotech companies are on the forefront in this battle against the ongoing pandemic.

## Product analysis by therapeutic area and development phase

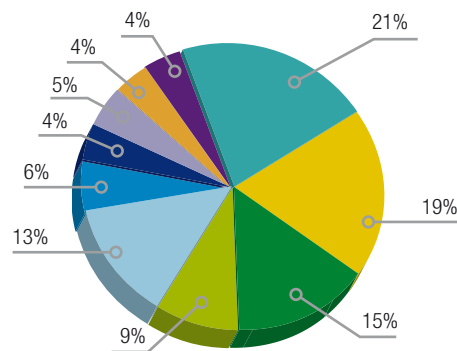
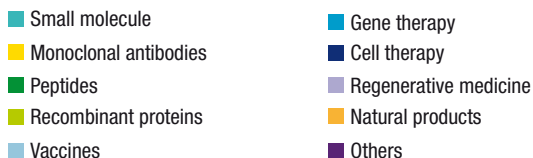


<sup>1</sup> ISTAT, 2019

# Projects analysis per type

- The vast majority of the therapeutical products being developed refer to molecules classified as biopharmaceuticals (56%), according to the definition which includes monoclonal antibodies, recombinant proteins, vaccines and advanced therapies products. If we also take into account the 9 natural products being developed, which just to mention a few include proteins extracted from human or animal tissues and cells, blood products and exosomics, then the percentage of the bioproducts grows to 60%.
- In the new projects analysis we can find the research of new active ingredients of chemical synthesis – such as small molecule and peptides – developed thanks to the use of biotechnological methods which overall represent the remaining 40% of the products. This figure confirms that in less than five years, the share of biopharmaceuticals has grown progressively (from 40% in 2015 to 56% in 2019), to the detriment of the contribution of low molecular weight composites, which percentage dropped from 32% to 21%. The same trend also stands out from the analysis of the pipeline projects, per type and developing phase; as the developing phase progresses, the biopharmaceuticals share gets more significant with respect to the small molecules developed or selected through biotechnological screening methods.
- In relation to the growing biotech commitment in the infectious diseases field, the increase of new vaccines products stands out. Almost three time as much in five years, going from 5% to 13%.

## Product analysis per type



# Orphan Drugs

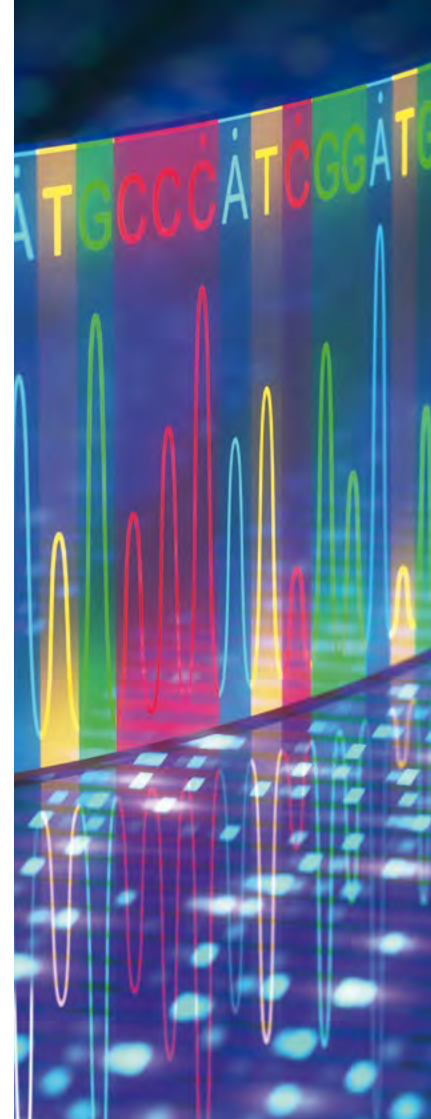
- Orphan drugs are pharmaceutical agents developed to prevent and treat rare medical conditions, which hit no more than 5 people every 10,000 inhabitants in Europe. For ethical reasons, the legislator encourages the development of such drugs also through simplified authorized procedures and ad hoc price policies.
- Italy's strength is its scientific placement in this field, as it can rely on a proper record in terms of scientific publications on the rare diseases.
- Twelve Italian biotech companies, which have been granted at least one orphan drug designation, have been identified. Grants which are being assigned by the European Medicines Agency – EMA in Europe and by the Food and Drug Administration – FDA in the USA. Out of 14 products identified, 4 of these have been granted by both the European and the American agencies.
- These products are primarily intended for oncology (36%) and dermatology (29%), which mainly use gene therapy vectors (21%) in order to fix the genetic defect or recombinant proteins (21%), to replace the missing protein or functional deficit.

Orphan Drug Designation	Number of Projects
EMA	8
FDA	2
EMA + FDA	4
Total	14

# Advanced therapy medicinal products

- Our country represents an excellence in the advanced therapy field, by being one of the first countries to have contributed significantly to the introduction of a vast number of products on the European market.
- With the development of 45 products, which are the result of the research by 20 companies, the advanced therapy medicinal products, which includes the somatic cell therapy, gene therapy and regenerative medicine, are mainly focused on those diseases which still cannot find an adequate therapeutical treatment such as oncology (36%), dermatology (22%) and skeletal muscular disease (13%).
- On top of the 12 regenerative medicine products, an additional 10 projects which will be developed as medical devices and 3 products developed as tissue and organ transplant, are to be added. These are mainly from animal origin or synthetic scaffolds, recellularized with autologous stem cells, de-epidermized dermis or injectable patches from amniotic membranes.

	Cell Therapy	Gene Therapy	Regenerative Medicine	Total
Discovery	3	5	0	8
Preclinical	6	9	12	27
Phase I	0	5	0	5
Phase II	4	1	0	5
<b>Total</b>	<b>13</b>	<b>20</b>	<b>12</b>	<b>45</b>



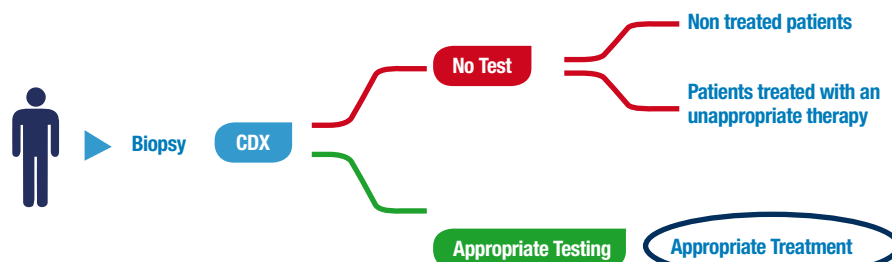
## Diagnostics

- The human genome sequencing and the impressive technological developments, which allows to analyse the entire genome in a rapid and cheap way, have made the individual genomic profile coding available on a larger scale. Thanks to sophisticated tools, which combine the molecular biology performance with precision mechanics, nowadays it is possible to simultaneously analyse multiple individuals and extract the data from a significant number of biological samples.
- There are 199 Italian firms which develop diagnostic products and services for human healthcare, almost 30% of the entire biotech industry in Italy. Most of these are micro companies (65%), located in Lombardy region (27%) and are focused on oncological projects.
- The identified companies, which represent both companies that are dedicated to diagnostics and companies that have marginal projects in this field, employ a total of 17,700 operators, 1,500 of which are active in biotech R&D and generate a turnover of over 2.2 billion euros, as a result of biotech R&D intra-muros investments of only 151 million euros.
- On this front, the creation of alliances with biobanks supranational systems, which follow biobanking standard procedures of several biological materials, are essential. The immediate availability of important resources for basic and industrial research, which would normally require years to be collected with the scope of specifically conceived studies, allows to obtain information which fits more to the population profile, in order to anticipate any gradual or intensive deviation.
- The aim is the fine-tuning of sophisticated diagnostic, preventive and prognostic, systems new pharmacological targets, supporting ultra-rapid clinical trials and in the near future also the creation of healthcare databases, which would allow patients to access personalized and efficient therapies, with less side effects.



## 4. Healthcare

- The in vitro diagnostic (IVD), apart from genetics, also include other fields which are quickly developing: clinical biochemistry, immunochemistry, immunohematology, microbiology e infectious immunology, just to mention a few. In several of these fields, the integration with artificial intelligence and machine learning, is a reality.
- Hence the reason why in vitro diagnostics represents an essential part to the healthcare assistance. The IVDs are used to diagnose, monitor, prevent and evaluate the predisposition to specific diseases, contributing to increase the available information for each single patient. They also allow for the planning of early and focused treatments, and heavily contribute to the reduction of hospitalization and medical recoveries, increasing the population health level, reducing the associated social and healthcare costs, promoting a long term economic growth.



Source: Medtech



# Bioeconomy as a response to the global challenges in the years to come...

- The bioeconomy, intended as a system which uses terrestrial and marine biological resources, just as waste, as power source input, energy and industrial production, has become a central topic for both the Italian and worldwide political debate, which are carefully looking after the environmental topics and productive processes sustainability.
- At the heart, there is the smart exploitation of renewable resources of biological origin, within a logic which can enhance the recycling opportunities by means of technological innovations.
- The agricultural, food industry, fishing industry, silviculture, wood and paper industry and the bio-based industries are all industries which are included in the bioeconomy. The bioeconomy is a very articulated field which includes multiple productive activities which as a common ground, have the renewable and biological input origin, despite each industry follows its own different development dynamics, which is influenced by the peculiarity of each field of application.

### ... biotechnologies, innovative incentive for bioeconomy

- Biotechnologies represent one of the main innovation sources for the bioeconomy. The development of an ecological and socially sustainable economy, requires a thorough revision of the current production and consumer models. This transition, which is partially ongoing, is made possible through a constant innovative effort which aims at the development of new processes, products and raw materials, especially in the traditional industries.
- The biotechnologies applied to industry and environment and at agriculture and veterinary fields, in particular, play a crucial role as main source of innovation for the bioeconomy industries.
- In the overall picture of a bioeconomy which is strongly linked to local areas, even more in the current crisis situation which has stopped the international supply chain, the biotechnologies can increase the innovation capacity of the Italian business sector fostering the development of short supply chains and the principle of a circular economy.



### Italy's role in the bioeconomy...

- In 2017 the overall activities connected to the bioeconomy in Italy, has generated an output of approximately 328 billion euro, giving work to over two million people<sup>1</sup>.
- The bioeconomy represents 10.1% and 7.7% in terms of production employment respectively, over the total economy of our country in 2017<sup>2</sup>.
- The bioeconomy importance over the overall economic activities, has grown in Italy for the last 10 years going from 8,8% over the national total in 2008 to 10.1% in 2017<sup>3</sup>.

### ...and biotech's role for the Italian bioeconomy

- Italy takes pride in some of the most innovative biorefineries worldwide, true flagship plants, first of its kind on a global scale. Among these, there is the first worldwide biobutanediol production plant in Veneto region, or the plant for second generation bioethanol in Piedmont. These plants not only develop sustainable and innovative products but are the result of reconversion processes of old abandoned plants.
- The biotechnologies within these biorefineries carry out their crucial role, by reducing the chemical multi-step processes in a single process, in a more sustainable way both in environmental and economic terms.
- Several local industries have developed on our national territory, which allow for the use of agricultural waste and food industry by-products to develop new innovative bioproducts, with several start-ups set up over the last few years.

<sup>1</sup> Bioeconomy in Europe, V Report. Intesa Sanpaolo, Assobiotech, 2019.

<sup>2</sup> *Ibid.*

<sup>3</sup> *Ibid.*



# The national bioeconomy strategy

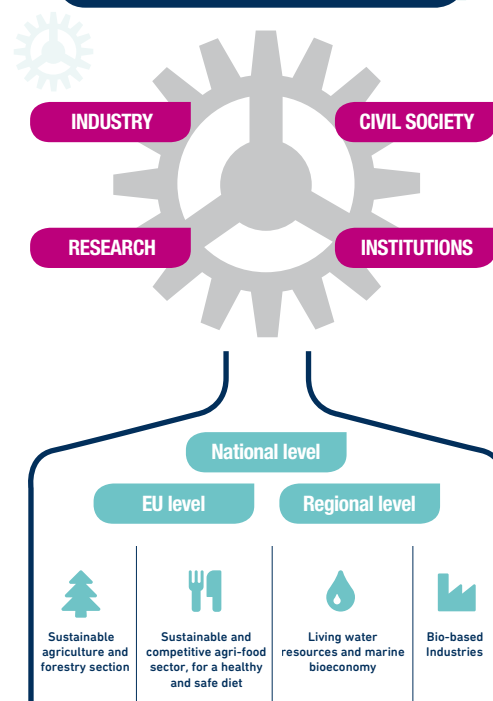
- In 2017, with the National Bioeconomy Strategy, Italy has set a very challenging goal: to reach a value of 300 billion euros and exceed 2 million job places by 2030. These goals have later been reintroduced in May of 2019, when the new National Strategy and the relative implementation plan have been presented during the "The Italian Bioeconomy: a revisited Strategy"<sup>1</sup> conference.
- The goal which has been set, is to reach a 15% increase in the current Italian bioeconomy performances by 2030. This strategy highlights the importance of research and innovation, to increase productivity, goods quality and the sustainability of each field included into the bioeconomy<sup>2</sup>.
- The National Bioeconomy Strategy has been revised in accordance to the new strategy adopted by the EU Commission on October 2018, and to the priorities which have been identified with regards to the new European research framework programme, Horizon Europe 2021-2027, as well as the new investments expected by the Bio-Based Industries Joint Undertaking (BBI JU) for the development of a sustainable industrial field based on bio-based in Europe.

<sup>1</sup> BIT II - Bioeconomy in Italy. Bioeconomy: a new strategy for a sustainable Italy, 2019

<sup>2</sup> Ibid.

### The integrated ecosystem of the Italian bioeconomy

**ITALIAN BIOTECH STRATEGY**  
Integration between sectors, systems, actors and institutions



Source: National bioeconomy strategy: BIT - Bioeconomy in Italy 2019



### A picture of the firms involved in the industrial & environmental field

	Total firms	Dedicated biotech R&D firms...	...of which, nationally controlled dedicated biotech R&D firms
Number of firms*	208	86	83
Biotech turnover**	2,089,148	239,933	227,722
R&D investment***	282,574	14,318	13,461
Biotech R&D investment***	38,304	13,317	12,604
Biotech employees**	2,695	670	633
Biotech R&D employees	676	290	282

Values in thousands of euros €/000

\* Latest data available, 2019, \*\* Latest data available, 2018, \*\*\* Total Intra-muros & extra-muros

- The overall turnover of firms dedicated to the industrial and environmental fields, exceeds 2 billion euros.
- The turnover of the nationally controlled dedicated biotech R&D companies, despite representing slightly more than 10%, has doubled since 2014.
- Between 2014 and 2018, the increase in intra-muros biotech R&D investments, has been more emphasized for non *dedicated biotech R&D firms* (+36%) than for those dedicated (+18%). These data seem to confirm the biotech growing role in redefining and renovate products and processes within different traditional industries

# The industrial biotechnologies, between innovation and sustainability

- Biotechnologies have various productive applications within the industrial field. By exploiting the bacteria metabolism and other microorganisms, new biomaterials and biofuels can be obtained from organic wastes or innovative services can be proposed on the market for waste management and the environmental decontamination (bio-remediation), apart from the preservation and restoration of the artistic heritage. Through enzymatic catalysis, it is possible to redevelop many traditional industrial processes, going from the paper, leather and textile industry to the cosmetic and detergent industries, increasing the efficiency in terms of costs and environmental sustainability.
- Through the use of industrial biotech, not only we can obtain innovative products which can satisfy new needs, but we can also redesign the productive processes of the traditional industries, in order to reduce the usage of natural resources (water and fossil fuel in the first place) and the production of waste, facilitating a transition towards the circular economy.
- The biobased industry, specifically the biomass chemistry, is a new-born field from an industrial and technological point of view, but it is developing and has already brought to market chemical substances which are present in day to day products, also thanks to the use of industrial biotech. The use of biomasses is a viable way to limit the impact of greenhouse gases and the dependency from crude oil. In Italy, we can find both big companies, which are research oriented and have relevant production plants, and medium-small firms which aim at the production of high added value products, obtained by renewable raw materials<sup>1</sup>.
- One of the main manifestation of the biobased manufacture is represented by the biorefineries, especially the second-generation ones which have been developed to convert waste or scraps in new high added value products, combining the bioeconomy and the circular economy. The efficiencies increase with which resources are being used, can have economic repercussions if we consider that energy and materials represent 50% of the operation costs borne by the SMEs<sup>2</sup>.
- According to the Biobased Industries Joint Undertaking forecasts, by 2030 at least 30% of the chemical products will be developed by means of biological resources, through the use of biotech processes (fermentation and biocatalysis).

<sup>1</sup> Federchimica, Italian chemical industry report 2018-2019.

<sup>2</sup> OCSE - Working Party on Biotechnology, Nanotechnology and Converging Technologies, Realising the Circular Bioeconomy, OECD Science Technology and Industry Policy Paper No. 2018/60.



### A picture of the firms involved in agriculture & veterinary

	Total firms	Dedicated biotech R&D firms	...of which, nationally controlled dedicated biotech R&D firms
Number of firms*	60	24	23
Biotech turnover**	856,313	15,058	14,358
R&D investment**	60,160	7,855	6,145
Biotech R&D investment***	16,580	7,481	5,771
Biotech employees**	1,221	147	138
Biotech R&D employees**	209	86	85

Values in thousands of euros €/000

\* Latest data available, 2019, \*\* Latest data available, 2018, \*\*\* Total Intra-muros & extra-muros

- The turnover of companies involved in the agriculture and veterinary field, exceeds 850 million euros.
- Over half of the micro and small firms are *dedicated biotech R&D firms*, and there is no record of medium or big companies.
- The share of the intra-muros R&D investments over the biotech turnover for the *dedicated biotech R&D firms*, most of which are nationally controlled, exceeds 40%.



# Agribusiness industry, an innovation challenge based on sustainability

- The overview of the companies which operate in the agricultural and veterinary industry in Italy, is extremely diversified. The common element is the remarkable R&D activities. In 80% of the cases, we are talking about small and micro companies.
- These firms common mission, is the use of molecular biology techniques, more or less advances, for the agricultural, livestock and food progress and innovation, in order to be more efficient, safe and sustainable, apart from the development of products and services for the veterinary industry. There are various activities to which these firms are dedicated. R&D activities with the help of molecular biology techniques, diagnostics and molecular characterization, field testing of various plants and biomaterials are essentially service activities carried out for third party companies. The production of biological crop protection products, biostimulatives and biofertilizers, the activities for genetic improvements (breeding) of various plants, and making advanced veterinary therapies available are all areas which provide advanced biotech solutions to the related production industries.
- The Italian public research had widely demonstrated an excellent profile with regards to the applied biotechnologies aimed at the plant genetic improvement (Plant Breeding Innovation). The information availability on the cultivations' genome represents the basis upon which enhance the local biodiversity, in response to the need for the specialized and diversified Italian agriculture.
- The frontier of plant genetic improvement is represented by the most sophisticated genetic editing techniques. The plants' genetic profile know-how and the availability of fast and precise techniques which can act within a single species, without any use of external genetic material, allows to challenge a series of problems typical for the Italian cultivations. A recent document by the Italian Federation Life & Science, «Genome Editing for the Italian agriculture – Ongoing projects example», present a series of research projects regarding tomatoes, barley, wheat, rice and vines which testify the potential of this research branch for a technologically advanced, productive and sustainable agriculture.
- In this context, the regulatory framework and its development are critical for the situation, which needs to guarantee the consumers' safety, and should consider adequate rules in line with the characteristics of this technology, without obstructing the development. First, it is necessary to allow field testing, without which research cannot progress.
- In an environment where research can make progress, promote the technological transfer, protect the intellectual property, support the co-operation between public and private sectors, explore the integration with digital and automation technologies, the Italian research can also contribute to the urgent need for a national agricultural modernization, without losing the traditional and qualitative characteristics, meeting at the same time the consumers' need, to preserve the environment, integrating in the ambitious European Green Deal challenge.

- The current analysis has been completed thanks to the cooperation between Assobiotec's Study Center and the Industry and Business Association Unit of ENEA.

- The information has been collected from the questionnaires sent to the firms, from the available financial statements, from public data and from the companies' web sites.

The data from the previous years have been re-elaborated on the basis of the enlargement of the surveyed firm population and of the new available information.

- The definitions and the data processing follow the guidelines developed by OCSE\*. These guidelines take into consideration the following business fields:

- biotech firms: companies which use at least one biotech technique to produce goods or services and/or to carry out biotech R&D activities. Some of these companies are big in size, with just a small side of their economic business related to biotech activities;

- *dedicated biotech R&D firms*: firms that devote 75% or more of their total intra-muros R&D to biotechnology R&D.

- With reference to the field of application within which biotech activities are being carried out, the firms are classified in the report as follows:

- Healthcare: firms whose predominant activity is in the human healthcare

industry, utilizing modern biotech methods for research, development and production of diagnostic products, treatment and disease prevention (drugs, new therapies, vaccines, diagnostic systems, molecular pharming);

- Agriculture & veterinary: firms whose predominant activity is in the agricultural and zootechnical industries, using modern biotech methods to improve the animal and vegetal production, increasing production and quality, improving the environmental adaptability characteristics and resistance to pathogens, or to develop biological and environmentally friendly products for the safeguard of plants and animals (including veterinary);

- Industrial and environment: firms which utilize modern biotech methods mainly in the industrial field, for the redevelopment of conventional productive processes, for the transformation of renewable biomasses into energy bioproducts, for the application in the food industry, nutraceuticals and cosmeceuticals, for the fine-tuning of diagnostic systems and environmental decontamination, or for products used in the restoration and conservation of the artistic heritage;

- Genomics Proteomics and Enabling Technologies (GPET): firms which use modern biotech methods primarily in the field of «omic» disciplines (genomics, proteomics, transcriptomics etc.); bioinformatic technologies, systems biology, biochips, biosensors; base research.

\*Friedrichs, S. and B. van Beuzekom (2018), "Revised proposal for the revision of the statistical definitions of biotechnology and nanotechnology", OECD Science, Technology and Industry Working Papers, 2018/01, OECD Publishing, Paris.

# 7. Italian biotech companies

- 3 C.I. srl
- 4F Biotech srl
- 4Lab Diagnostics srl
- A&A Fratelli Parodi spa
- A. Costantino & C. spa
- AAT Advanced Analytical Technologies srl
- AB Analitica srl
- Abbvie srl
- Abich srl
- Abiel srl
- Aboca spa
- Abresearch srl
- Accelera srl
- Achilles Vaccines srl
- Acqua & Sole srl
- Acque del Chiampo spa
- ACS Dobfar spa
- Active Cells srl
- Actygea srl
- Aczon srl
- Adamas Biotech srl
- Adienne srl
- Advanced Accelerator Applications Italy srl
- Advent srl
- AEP Polymers srl
- Aequilibrium Pharma srl
- Aethia srl
- Agrienergy Bio srl soc. agr.
- Agrifutur srl
- AgriNewTech srl
- Agririgenera srl
- Agritest Srl
- Agroalimentare Sud S.p.A.
- Agrobiotech soc. coop.
- Agrolis Technologies spa
- Agrolabo spa
- Alchemical Dynamics srl
- Alexion Pharma Italy srl soc. unipersonale
- Alfasigma spa
- Alga&Zyme Factory srl
- Algain Energy srl
- AlgaRes srl
- Alia Therapeutics srl
- Alifax Research & Development srl
- Allelica srl
- Allergan spa
- Allergopharma spa
- Alltox srl
- Alphagenics Biotech srl
- Also Biotech srl
- Altergon Italia srl
- Altheia Science srl
- AMBC Advanced Molecular and Biological Computation srl
- Ambiotec sas di Ammendola Sergio
- Ambrosialab srl
- Amgen srl
- Amiko srl
- Amp Biotech srl
- Amypopharma srl
- Anallergo srl
- Ananas Nanotech srl
- Anemocyte srl - ex Areta International srl
- Angelini ACRAF spa
- Anika Therapeutics srl
- Apotech Peptidi & Cosmesi srl
- Aptenia srl - Società Agricola
- Aptuit srl
- Apulia Biotech srl
- ARC - Centro Ricerche Applicate srl
- Archimede R&D srl
- Ardis srl
- Aries srl
- ART - Apta Regenerative Technologies srl
- Arta Peptidion srls
- Arterra Bioscience srl
- Asoltech srl
- Astrazeneca spa
- ATPr&d srl
- Atrofrix srl
- Aurora Biofarma srl
- Autifony srl
- Avantea srl
- Axxam spa
- Bactory srl
- BASF Italia srl
- Baxter spa
- Bayer spa
- BBA Ecotech srl
- BD Biodigressioni srl
- Be Biotech srl
- Beauty Genomics srl
- Beauty System Pharma srl
- BGT Italia Biogenomic Technology srl
- Bict srl
- Bio Aurum srl
- Bio Fab Research srl
- Bio Soil Expert srl
- Bioaesis srl
- Bioagro srl
- Bioart srls
- Biobanca Biogem srl
- Biocell Center spa
- Biocompatibility Innovation srl
- Biodermol Ambiente srl
- Biodiagen srl
- Biodiversa srl
- Bioecopest srl
- Bioenologia 2.0 srl
- BIOerg srl
- Biofaber srls
- Biofer spa
- Biofield Innovation srl
- Biofinext srl
- Biofordrug srl
- Biogas Nord soc. agr. a r.l.
- Biogen Italia srl
- Biogenera spa
- Bioinformatics Resource For Omics Wide Services srl
- Bioinnotech srl
- Bio-Innovation srls
- Bioman srl
- Biomedical Research srl
- Biomerieux Italia spa
- Biomol Laboratories srl
- Biomole srl
- Biomolecular Research
- Genomics srl
- Bionat Italia srl
- Bio-net srl
- Bionova srl
- Bio-on srl
- Bio-P srl
- Biopepticom srl
- Biopharma srl
- Bioplantec srl
- Biopoliffe srl
- BioPox srl
- Biorek srl
- Biorep srl
- Bioridis srl
- Biorigen srl
- Bioscience Genomics srl
- Biosearch Ambiente srl
- Biosearch srl
- Biosensing Technologies srl
- Biosensor srl
- Bioside srl
- Biosphere srl
- Biosyntex srl
- Biosynth srl
- Biotec Fermenti srl
- Biotec Sys srl - BTS
- Biotecgen srl
- Biotech Ingredient Solutions srl
- Bioteck srl
- Biotechnologie BT srl
- Biotecnomed scarl
- BioTekNet scpa
- Biouniversa srl
- Biovalene srl

## 7. Italian biotech companies

- Biovecblok srl
- Bio-Ve-Oil Olimpo srl
- Biovix srl
- Blast Research srl
- Boehringer Ingelheim Animal Health Italia spa
- Boehringer Ingelheim Italia spa
- Bracco Imaging spa
- Brain Innovation srl
- Braintech srl
- Bristol-Myers Squibb srl
- BSA Ambiente srl
- BSL Cosmetics srl
- BSP Pharmaceuticals srl
- Bt-innovachem srl
- BTM Biological Tools for Mediterranean Agriculture srl
- BTS Biogas Italia srl - gmbh
- Byflow srl
- C&M Bioscience srl
- C. Sandroni & C. srl
- C4T scarl
- C5-6 Italy srl
- CA.RE.BIOS Campus Regiologia srl
- Cage Chemicals srl
- Capua Bioservices spa
- Caresilk srls
- Cartilago srl
- CCS Aosta srl
- Ceinge Biotecnologie Avanzate srl
- Celgene srl
- CellDynamics srl
- Cellply srl
- Centro Sperimentale del Latte srl
- Cereal Docks spa
- Charybdis Vaccines srl
- Checkmab srl
- Chermi spa
- Chemical Center srl
- Chemicare srl
- Chiesi Farmaceutici spa
- Chr Hansen Italia spa
- Chrono Benessere srl
- Clonit srl
- CO.PRO.B. - Cooperativa Produttori Bieticoli sca
- Coccitech srl
- Cogep srl
- Colorobbia Consulting srl
- Congenia srl
- Consorzio Interdisciplinare di Studi Biomolecolari ed Applicazioni Industriali srl
- Consorzio Interuniversitario di Ricerca in Chimica dei Metalli nei Sistemi Biologici
- Consorzio Italiano Biogas e Gassificazione
- Consorzio per il Centro di Biomedicina Molecolare srl
- Convergenome srl
- Coop Italia Società' Cooperativa
- Coqua Lab srl
- Corion Biotech srl
- CPC Biotech srl
- Crabion srl
- CRC Biotek srl
- Croda Italiana spa
- CryoLab srl
- Cypraea - Cooperativa di Ricerca e Studi per la Pesca l'Acquacoltura e l'Ambiente
- Cypress Biotechnology srl
- Daimar srl
- Dalton Biotecnologie srl
- Danone spa
- Demethra Biotech srl
- Demus spa
- Dermagenomic srl
- Detoxizymes srl semplificata
- Dia.Pro - Diagnostic Bioprobes srl
- Dia-Chem srl
- Diadem srl
- Diamante srl
- DiaSorin S.p.A.
- Diatch Pharmacogenetics srl
- Diatch srl
- Diatheva srl
- Dicofarm spa
- Diesse Diagnostica Senese spa
- Dival Toscana srl
- DNA Biolab srl
- DNAtch srl
- Dompe' Farmaceutici spa
- Dott. Dino Paladin - CRS
- Dow Italia spa
- Dphar spa
- Dtech srl
- Ecobioservices and Researches srl
- Ecoreach srl
- Eco-Sistemi srl
- Ecotechsystms srl
- Edgelab srl
- Eggplant srl
- Elettra - Sincrotrone Trieste S. C. p. A.
- Eli Lilly Italia spa
- Elitechgroup spa
- Eltek - spa
- Enbiotech srl
- Endolife srl
- Ener-Idea srl
- Enerzyme srl
- Engenome srl
- ENI spa
- Enrico Giotti spa
- Enthera srl
- Enza Zaden Italia Research srl
- Ephood srl
- Ephoran Multi Imaging Solutions srl
- Epi C srl
- Epigen Therapeutics srl
- Episkey srl
- Epitech Group spa
- Eridania Italia spa
- Erydel spa
- Espikem srl
- Etna Biotech srl
- Eudendron srl
- Eugene srl
- Eugenomics srl
- Euremab srl
- Euroclone Diagnostica srl
- Euroclone spa
- Eurocoating spa
- Eurofins Genoma Group srl
- Eurospital spa
- Eurovix spa
- Euticals spa
- Evobiotech srl
- Evolution Technology Laboratories srl
- Ewvix srl
- Exenia Group srl
- Exosomics Siena spa
- Experteam srl
- Explora srl
- Exprivia spa
- Fama ID srl
- Fastest srl
- Fatro spa
- Fem2 - Ambiente
- Ferrania Chemicals srl
- Ferring spa
- Fic Htmd srl
- Fides Pharma srl
- Fidia Farmaceutici spa
- Fin-Ceramica Faenza spa
- FIS - Fabbbrica Italiana Sintetici spa
- Fitobiotech srl
- Flora Conservation
- Flowmetric Europe srl
- Fluidia srl
- Fly Life srl
- Fotosintetica & Microbiologica srl
- Franvax srl
- Fresenius Medical Care Italia spa - Ricerca
- G&Life spa

## 7. Italian biotech companies

- Galascreen srl
- Galatea Bio Tech srl
- Galileo Research srl
- Galkem srl
- Geckobiotech srl
- Geltis srl
- Gem Forlab srl
- Genechron srl
- Genedia srl
- Genefast srl
- Genenta Science srl
- Generon srl
- Genesis Bioscience srl
- Genespin srl
- Genetic Services srl
- Geneticlab srl
- Genomix4Life srl
- Genomnia srl
- Genovax srl
- Genprobio srl
- Gen-Tech srl
- Gentium srl
- Gentoxchem srl
- Gentras snc
- Gexnano srl
- Gilead Sciences srl
- Giotto Biotech srl
- Glaxosmithkline spa
- Glaxosmithkline Vaccines srl
- Glures srl
- Gnosis Bioresearch srl
- Gnosis spa
- Grape & Grape Group srl
- Green Service srl
- Greenbone Ortho srl
- Greentech srl
- Gruppo Ricerche Avanzate Per l'Enologia srl
- GSK Vaccines Institute for Global Health srl
- Hera spa
- HMGBiotech srl
- Holostem srl
- Hospira Italia srl
- Hu.Gen srl
- Hydrosynergy soc. coop.
- Hygeia Lab srl
- Hype Biotechnologies srl
- Hyris Limited
- IGA Technology Services srl
- Igenesis srl
- Immagina Biotechnology srl
- ImmunePharma S.r.l.
- In3Diagnostic srl
- In4Tech Bioprocess srl
- In4Tech srl
- Incyte Biosciences Italy srl
- Indena spa
- Industria Meridionale Alcolici srl
- Industriale Chimica srl
- Ingenomics srls
- Inkidia srl
- Innoven srl
- Instabact srl
- Integrated Systems Engineering srl
- International Institute for Clinical Research and Analysis srl
- Investors srl
- IOM Ricerca srl
- Ipsen spa
- IRBM Science Park spa
- Irides srl
- Isagro spa
- ISB - Ion Source & Biotechnologies srl
- Isenet Biobanking srl
- Iss Biosense srl
- Istituto Biochimico Italiano Giovanni Lorenzini spa
- Istituto di Ricerche Biomediche Antoine Marxer RBM spa
- Istituto Ricerche Applicate srl
- iSweet srl
- Italfarmaco spa
- Ixtal srl
- Izo srl
- Janssen Cilag spa
- Jointherapeutics srl
- Jonica Green Oil srl
- Kayser Italia srl
- Kedrion spa
- Kemira Italy spa
- Kemotech srl
- Kialab srl
- Kither Biotech srl
- Kitos Biotech srls
- Kos Genetic srl
- Kron Morelli srl
- Kronosdna srl
- Ktedogen srl
- L.A.V. Laboratorio Analisi Veterinarie srl
- Labor srl
- Laboratori Biomicon srl
- Laboratori Turval Italia srl
- Laboratorio Di Micro E Submicro Tecnologie Abilitanti Dell'Emilia Romagna - Mist E-R scrll
- Lamberti spa
- Latì Industria Termoplastici spa
- Lay Line Genomics spa
- Lazzeri Società Agricola a r.l.
- LB Lyopharm srl
- LCM Genect srl
- Lead Discovery Siena srl
- Leafgreen srl
- LEBSC srl
- Lesaffre Italia s.p.a.
- Lgv1 S.r.l.
- Lifegene sas
- LifeLineLab srl
- Lighthouse Biotech srl
- Liosintex srl
- Lipinutragen srl
- Lofarma spa
- Macrofarm srl
- Magis Lab srl
- Mat 2.0 srl
- Mater Biotech spa
- Materias srl
- Matrica spa
- Mediapharma srl
- Medical Research Institute srl - MRITLab
- Medifarmagen srl
- Meditekology srl
- Mediterranea Biotecnologie srl
- Mediterranea Theranostic srl
- Memmia srl
- Menarini Biotech srl
- Menarini Ricerche spa
- Menarini Silicon Biosystem spa
- Merck Serono spa
- Meristema srl societa' agricola
- Metis Precision Medicine SB srl
- Micamo srl
- Micro Biological Survey - MBS srl
- Microbiol snc di Sergio Murgia e C.
- Microbion srl
- Microbiotec srl
- Microgem srl
- Microgenomics srl
- Micromilk srl
- Microtech srl
- Microtide srl
- Mindseeds Laboratories srl
- ML Biotech Italia srl
- Mogu srl
- Molecular Biotechnology srl
- Molecular Horizon srl
- Molipharma srl
- Molirom srl
- Molmed - Molecular Medicine spa
- Molteni Therapeutics srl
- Monsanto Agricoltura Italia spa
- Monteresearch srl
- MSD Italia srl
- Mttlab srl

- Mybatec srl
- Nabitech srl
- Naicons srl
- Nanofaber srl
- Nanomed3d srl
- Nanoshare srl
- Nanosilical Devices srl
- Nanosynthes srl
- Nanovector srl
- Natimab Therapeutics srl
- Natural Technologies Italia srl
- Navhetec srl
- Naxospharma srl
- NCR Biochemical spa
- Nealys srl
- Need Pharma srl
- Neo Bioma srl
- Neutron SpA Unipersonale
- Nerviano Medical Sciences srl
- Net4Science srl
- Neuheart srl
- Neuro Visual Science Technology srl
- Neuro-Zone srl
- New Gluten World srl
- Newron Pharmaceuticals spa
- Newronika srl
- Next Genomics srl
- Nextage srl
- Nextgen srl
- NGB Genetics srl
- Nib Biotech srl
- Nice srl
- Nila Medica srl
- No Self srl
- Nobil Bio Ricerche srl
- Noivita srls
- Norgine Italia srl
- Nouscom srl
- Novaetech srl
- Novagenit srl
- Novaicos srls
- Novamont spa
- Novartis Farma spa
- Novo Nordisk spa
- Noxamet srl
- NTP Nano Tech Projects srl
- Nurex srl
- Nutraceutica srl
- Nutrigene srl
- Nutrinsect srl
- Oacp srl
- Olon spa
- Oncologica srl
- Oncocox Biotech srl
- Onyel Biotech srl
- Ophera srl
- Orionetix srl
- Orpha Biotech srl
- Orphan Europe Italy srl
- P4P srl
- P680 soc. ag. a rl
- Panoxivir srl
- Pentares Biopharma srl
- Personal Genomics srl
- Petropark srl
- Pfizer Italia srl
- Pharma Life srl
- Pharmadiagen srl
- Pharmamab srl
- Pharmamol srl
- Phenbiox srl
- Philogen spa
- Phy.Dia. srl
- Phymtech srl
- Phytoremedial srl
- PinCell srl
- Pioneer Hi-Bred Italia Servizi Agronomici srl
- Plasfer srls
- Plasmore srl
- Polo d'Innovazione di Genomica, Genetica e Biologia soc. cons. srl
- Polymerix srl
- Pomona Ricerca srl
- Postbiotica srl
- Prebiomics srl
- Prigen srl
- Primm srl
- Prindex srl
- Prius Sistema Integrato Diagnosi e Terapia srl
- Probiokem srl
- Probiotic CGB srl
- Probiotical spa
- Proge Farm srl
- Promis Biotech srl
- Prosit srl
- Prosol spa
- Proxenia srl
- ProXentia srl
- Ptc Therapeutics Italy srl
- Qisnobia srl
- React4life srl
- Real Gene srl
- Recordati Industria Chimica e Farmaceutica spa
- Reithera srl
- Remembrance srl
- Repros srl
- Research & Innovation srl
- Research Toxicology Centre spa
- Resindion srl
- Revelo Datalabs srl
- Rhemastem srls
- Ricerche Sperimentali Montale srl
- Rigerand srl
- Roche spa
- Roelmi HPC srl
- Roquette Italia spa
- Rottapharm Biotech spa
- S&P Brain srl
- S.I.F.I. Società Industria Farmaceutica Italiana spa
- S.P.A. - Società Prodotti Antibiotici spa
- Sacace Biotecnologies srl
- Sacchetto spa
- Sacco srl
- SAFAN Bioinformatics sas
- Safood srl
- SAIPAN srl
- Salentec srl
- Salugene srls
- Sandoz Industrial Products spa
- Sannio Biotech srl
- Sanofi spa
- Sclavo Diagnostics International srl
- Scylla Biotech srl
- Sea Marconi Technologies di Vander Tumiatti sas
- Sedicidodici srl
- Seno Seed srls
- Sentinel CH spa
- Serge Genomics srl
- SetLance srl
- Shire Italia spa
- Shoreline Società Cooperativa
- Sibylla Biotech srl
- Sienna Biopharmaceuticals srl
- Sigea srl
- Silk Biomaterials srl
- S-in Soluzioni Informatiche Srl
- Sirius-Biotech srl
- Smartbiogas srl
- Smartseq srl
- Smartvase srl
- Società Italiana Sementi spa
- Società Metropolitana Acque Torino spa
- Società Produttori Sementi spa
- Softmining srl
- Somatogenics Social Enterprise srl
- Sooft Italia spa
- Spaceland Italia srl
- Sphera Encapsulation srl
- Spike Renewables srl
- Spinoff srl

## 7. Italian biotech companies

- Stallergenes Italia srl
- Stemgen spa
- STMicroelectronics srl
- Strigolab srl
- Symbiagro srl
- Symrise srl
- Synbiotec srl
- Syngenta Italia spa
- Takeda Italia spa
- Takis srl
- Technogenetics srl
- Tecna srl
- Tecno S.E.A. srl
- Tecnobios Procreazione srl
- Tectronik srl
- Tecup srl
- Telea Biotech srl
- Tensive srl
- Teracell srl
- Tes Pharma srl
- Tethis spa
- Thankstem srl
- Thena Biotech srl
- Theoreo srl
- Tib Molbiol srl
- Tissuegraft srl semplificata
- Tissuelab spa
- Toma Advanced Biomedical Assays spa
- TOR srl - Tissue and Organ Replacements Udine
- Transactiva srl
- Trustech srl
- Tydock Pharma srl
- Typeone srl
- UB-Care srl
- UCB Pharma spa
- Ufpeptides srl
- Ulisse Biomed srl
- UN.E.CO. Srl
- Unilab sas
- Unistrains srl
- University of Pittsburgh Medical Center Italy srl
- Uptofarm srl
- Ustem srl
- Valagro spa
- Vaxxit srl
- Vaxynethic srl
- Veneziana Energia Risorse Idriche Territorio Ambiente Servizi - V.E.R.I.T.A.S. spa
- Vera Salus Ricerca srl
- Versalis spa
- Vetogene srl
- Vetspin srl
- Vevy Europe spa
- Villani spa
- Virostatics srl
- Visionage srl
- Vismederi Research Srl
- Vismederi Srl
- Vitroscreen srl
- VivaBioCell spa
- Wellmicro srl
- Wetware Concepts srl
- Xeda Italia srl
- Xeptagen spa
- Ylichron srl
- Ystem srl
- Zoetis Manufacturing Italia srl

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