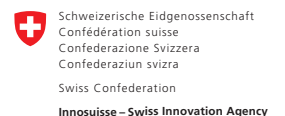




Swiss Biotech Report 2021

Agility, leadership
and innovation in the
time of COVID-19



“The biopharma industry’s response to COVID-19 has truly been a global one – with Swiss companies and academic institutions at the forefront. Swiss-based biopharma players are contributing across the spectrum of patient needs.”

George Scangos | Vir Biotechnology, Inc.

“2020 was the best year ever for Swiss biotech in relation to financing activities, with a total of approximately CHF 3.4B raised.”

Jürg Zürcher | GSA Biotechnology Leader, EY

“Compared to 2019, trading volumes rose sharply by 177% and the total free float market capitalization of all SIX-listed biotech companies was up 30% on 2020.”

Fabian Gerber | SIX



Agility, leadership and innovation in the time of COVID-19

“Technologies developed by scientists in Switzerland have been crucial in the fight against COVID-19, including cloning the virus, cryo electron microscopy to visualize the spike proteins, and the use of radioactive molecules that bind to receptor proteins to investigate how the virus enters the host.”

Florian Fisch | Swiss National Science Foundation

“On May 1 2020, Moderna and Lonza announced a strategic collaboration to enable manufacturing of up to 1 billion doses of the vaccine per year. Lonza acquired equipment and built the production lines in just 8 months.”

Jan Lucht | scienceindustries

“Industrial biotechnology has the potential to improve manufacturing industry’s performance, energy efficiency and product value and yield viable sustainable solutions to protect our environment.”

Willy Gehrler and Hans-Peter Meyer | Swiss Academy of Engineering Sciences SATW

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Guest editorial



George Scangos, Ph.D.
President and CEO,
Vir Biotechnology, Inc.

“The biopharma industry’s response to COVID-19 has truly been a global one – with Swiss companies and academic institutions at the forefront. Swiss-based biopharma players are contributing across the spectrum of patient needs, including Roche with diagnostic solutions, Novartis with treatments and Lonza with manufacturing and logistics.”

While 2020 will forever be remembered as one of the most challenging years in our lifetimes, all of us in biopharma can take tremendous pride in the vital role our industry is playing in response to the COVID-19 pandemic. In the face of this unprecedented health crisis, the industry has worked at lightning speed to develop treatments and vaccines that provide the first significant promise in this long fight. And the resolve, dedication and ingenuity we have demonstrated will forever shape our industry going forward. The theme of the 2021 Swiss Biotech Report – “agility, leadership and innovation in the time of COVID-19” – is indeed appropriate.

The biopharma industry’s response has truly been a global one – with Swiss companies and academic institutions at the forefront. This comes as no surprise to me. With its academic and research excellence, the presence of leading universities and research-oriented pharmaceutical companies and a competitive nature, Switzerland has long served as a hub of scientific innovation.

I have been fortunate in my career to experience these riches firsthand. First, during my tenure as CEO of Biogen, Biogen’s international headquarters were based in Paris, but we moved them to Zug. And, after an international search to select a site for a large manufacturing plant, we located that plant in Solothurn, it is important to note that Solothurn was not the lowest-cost location. Rather, the decision recognized the incredible scientific expertise and the talented workforce in Switzerland, among other factors. The result was a USD 1.2B investment for a plant that is now coming online.

Now, at Vir Biotechnology, we are benefiting greatly from the discoveries brought forth by the brilliant scientists at our subsidiary, Humabs Biomed SA, which is based in Bellinzona. The Humabs scientists discovered an antibody that reduces mortality in Ebola patients, and this was approved by the US FDA in December 2020. In addition, the Humabs team discovered this differentiated monoclonal antibodies that are currently being evaluated in clinical trials for patients with COVID-19.

Indicative of a larger global trend, Switzerland’s outstanding response to COVID-19 has emerged not only from industry, but also from its universities and institutes, including ETH Zurich, EPFL in Lausanne and the Institute for Research in Biomedicine in Bellinzona.

Since the beginning of the pandemic, we have witnessed extensive collaboration between biopharma companies and academic and government partners – as well as within the industry, such as Vir’s own collaboration with GlaxoSmithKline to evaluate and advance our monoclonal antibodies. These partnerships facilitated the unprecedented success of our response, and bode well for our ability to address other global infectious diseases and prepare for future pandemics.

The pandemic forced the industry to rapidly construct new approaches for developing therapies and vaccines, taking what was previously perceived as impossible and turning it into reality. As we look to the future, I am optimistic that our global scientific, biopharma and healthcare community will take the lessons from COVID-19 and apply them to our world’s most urgent patient needs, including future pandemic preparedness.

Swiss Biotech Association editorial

As one of the leading global biotech hubs, Switzerland was well positioned to facilitate international collaborations and to develop solutions to combat the COVID pandemic. This report highlights the ways in which Swiss universities, research centers, hospitals, diagnostic companies, biotech SMEs, drug manufacturers and multinational pharmaceutical companies worked with their partners around the world to deliver an effective response to limit the spread and impact of the virus.

While the spotlight was on COVID-related projects, Switzerland and Swiss biotech companies did not lose sight of other unmet medical needs. Over the year they continued to invest heavily to expand their R&D and manufacturing infrastructure, and to advance and broaden their portfolio of drug candidates and new modalities. Investors also contributed new funds at record levels (CHF 3.4B), investing into the promising pipeline of the Swiss biotech hub.

The COVID pandemic clearly demonstrated how much damage the uncontrolled spread of a pathogen can cause and how quickly it can sweep across the globe, affecting people's health and livelihoods and overwhelming healthcare systems even in the most developed countries. But the pandemic also showed that research capabilities and platform technologies developed over decades can be effectively used to respond rapidly to emerging medical needs and to provide therapeutic options to address them. The biotech and pharmaceutical industry's response to the COVID pandemic is multifaceted: diagnostics to detect the virus or virus-specific antibodies, COVID-specific vaccines and therapeutics which aim to combat the spread of the virus and strengthen people's immune system, and the use of established drugs that can alleviate symptoms. As a result of their success, the importance of the biotech and pharmaceutical industries became evident to decision makers around the world.

Several articles in this report outline projects and companies that were part of the response, as the life science industry applied its R&D and manufacturing capabilities to deliver effective solutions in record time. International scientific cooperation and coordination was clearly essential, and Switzerland's global networks proved to be an important strength, even when the borders were closed. We exemplify how Switzerland played a role in basic research (e.g. cloning and 3D structure of the virus), in manufacturing of vaccines (e.g. Lonza, Bachem, Janssen Cilag), providing diagnostics (e.g. Roche, Quotien, Ender, MosaiQ, Biolytix) and the development of COVID-specific therapeutics (Humabs Biomed/Vir Biotechnologies, Molecular Partners/Novartis).

While all eyes were focused on the COVID pandemic, the Swiss biotech industry also made significant progress in other areas. Investor interest was demonstrated by record levels of financing and the creation of new biotech-specific investment funds (e.g. Pureos Bioventures, Bernina Bioinvest). ADC Therapeutics completed a very successful IPO, raising more than USD 470M including follow on and dozens of private Swiss biotech companies closed financing rounds, with SOPHiA Genetics and VectivBio each raising about CHF 110M.



Michael Altorfer
CEO,
Swiss Biotech Association

For all the record-breaking success stories in the first eight months of 2020, a note of caution may be warranted. While the pandemic highlighted the importance of the biotech and pharmaceutical sectors, and interest from investors in the biotech sector remains very high, most of the funding and new partnerships were based on pre-COVID era data. Many companies have suffered significant delays in their R&D pipeline and require bridge financing to complete the delayed studies. If this additional funding can be secured and projects can get back on track, it is very likely that the biotech industry in Switzerland will continue its impressive expansion which has been seen in recent years.



Swiss Biotech in 2020: Facts & Figures

Jürg Zürcher

Partner, GSA
Biotechnology Leader



Frederik Schmachtenberg

Partner, Financial
Accounting Advisory Services



2020 was the best year ever for Swiss biotech in relation to financing activities, with a total of approximately CHF 3.4B raised. The industry's R&D spending was up 10%, while record FDA and EMA approvals were obtained, preparing the ground for future performance.

The global IPO class of 2020 was playing in a league of its own with a total of 84 IPOs (2019: 57), which generated more than USD 13.4B (2019: USD 6.4B) of new capital. Some 76 US IPOs were able to raise fresh money to the tune of approximately USD 12.7B (2019: 46 US IPOs / USD 5.6B). Besides the traditional IPOs, a little over one third of the newly public companies were using Special Purpose Acquisition Companies (SPAC) structures to become listed companies. Further, of the total global IPOs of 84, 8 were European IPOs, raising USD 0.7B (2019: 11 European IPOs / USD 0.8B).

Swiss biotech landscape

The Swiss biotech industry generated revenues of CHF 4.5B, compared to CHF 4.8B in 2019. This drop in revenues was mainly driven by favorable one-time events in 2019 (relating to AC Immune, Basilea and CRISPR) which didn't recur in 2020. Nevertheless, higher revenues for those biotechs selling marketed products/services continued to be achieved.

Swiss biotech financing

2020 was the best year ever for Swiss biotech in relation to financing activities, with a total of approximately CHF 3.4B raised.

Public companies were able to collect almost CHF 2.7B of fresh capital. This included the successful IPO of ADC Therapeutics from Lausanne on NYSE, which raised approximately CHF 260M, with the implementation of follow on financing in the fall for an additional CHF 210M. Other significant "cash collectors" were CRISPR Therapeutics with more than CHF 940M, Idorsia with CHF 866M and Molecular Partners with CHF 80M. Further, Basilea made use of the attractive interest environment, replacing an existing convertible loan with a new one of CHF 125M.

COMPANY	CHF MILLION
CRISPR Therapeutics AG	940
Idorsia	866
ADC Therapeutics	470
Basilea	125
Molecular Partners	80
Total	2,481

Table 1: Largest 2020 public rounds

The biggest portion of the private capital was raised by VectivBio Holding AG in a combination of equity and debt financing totaling CHF 135M. SOPHiA Genetics was also able to raise CHF 100M and the newly founded company Noema Pharma got an initial capital injection from the founding VCs of CHF 54M.

COMPANY	CHF MILLION
VectivBio Holding AG	135
SOPHiA Genetics	100
Noema Pharma	54
Total	289

Table 2: Major 2020 private transactions

"2020 was the best year ever for Swiss biotech in relation to financing activities, with a total of CHF 3.4B raised."

M&A and collaborations

Several Swiss biotech companies were also acquired in 2020 by either (big) pharma or other biotech companies. The following brief snapshot lists the most prominent transactions in 2020:

- Sumitomo Dainippon Pharma and Roivant Sciences completed their strategic alliance and the formation of a new company, Sumitovant Biopharma, a wholly owned subsidiary of Sumitomo Dainippon Pharma. Roivant received USD 3B from Sumitomo Dainippon Pharma in connection with this deal.
- Genkyotex announced the closing of the acquisition by Calliditas Therapeutics of a controlling interest in Genkyotex
- Boehringer Ingelheim acquired NBE-Therapeutics for EUR 1.18B, significantly enhancing its cancer pipeline portfolio with novel Antibody-Drug Conjugates (ADCs).

The Swiss biotech sector was successful not only on the financing front but also in the area of collaborations and licensing arrangements, and several successful new partnerships were established in 2020. Amongst those were:

- BC Platforms' partnership with Dante Labs to build Europe's largest Next Generation sequencing laboratory
- Genedata and the Crohn's & Colitis Foundation's collaboration to improve patient care in Crohn's disease
- Evolva's new collaboration agreement with International Flavors and Fragrances (IFF) to further develop and expand commercialization of vanillin
- Moderna and Lonza's worldwide strategic collaboration to manufacture Moderna's vaccine (mRNA-1273) against novel coronavirus
- Santhera's agreements in gene therapy research for congenital muscular dystrophy with Rutgers University
- BioMarin boosting its early-stage pipeline by penning a deal with Swiss startup Dinaqor
- Neurocrine Biosciences' option exercise to license Idorsia's novel treatment for rare pediatric epilepsy
- Boehringer Ingelheim's collaboration with CDR-Life to develop antibody fragment-based therapeutics for geographic atrophy, a leading cause of blindness worldwide

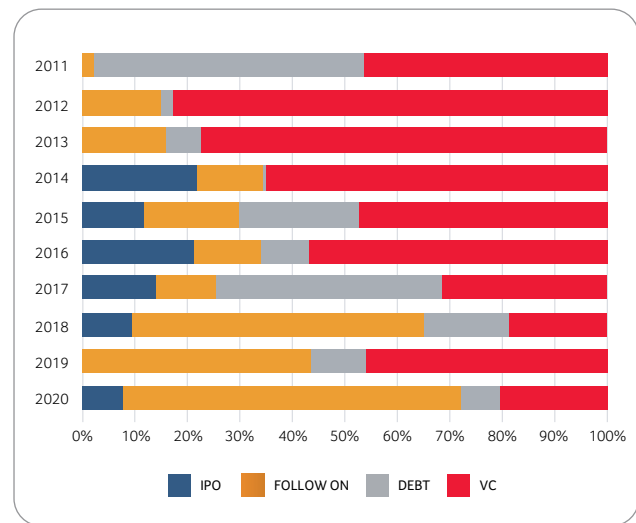


Figure 1: Biotech financing categories in Switzerland 2011 to 2020

- Numab Therapeutics and Boehringer Ingelheim's collaboration to develop multi-specific antibody therapeutics for cancer and retinal diseases
- BioVersys and partners from Lille signing a long-term collaboration agreement to create a unique cross-border AMR cluster in antimicrobial research excellence
- Memo Therapeutics AG and Northway Biotechpharma's new partnership to manufacture the startup's therapeutic COVID-19 antibody candidate
- Santhera's option exercise to obtain worldwide rights to Vamorolone in Duchenne muscular dystrophy and all other indications
- NBE-Therapeutics and Exelixis' new partnership to develop novel antibody-drug conjugates using NBE's unique ADC platform
- Polyphor's closing of Fosun Pharma licensing agreement for balixafortide in China and receipt of USD15M upfront payment
- Molecular Partners' collaboration with Novartis to develop two DARPIn® therapies designed for potential use against COVID-19

Product development

In 2020, the industry saw more approvals by the FDA (57 compared to 48 in 2019), all granted within a review period of less than a year, and there was also an increase of almost 50% in European approvals by EMA (97 compared to 66 in 2019). Swissmedic itself approved 42 new drugs in 2020, which was over a third more than the 29 approvals for innovative new drugs in 2019.

Nevertheless, there were also some setbacks to be noted during 2020. For example, Santhera Pharmaceuticals reported in October 2020 that the Phase III results for the SIDEROS study in DMD did not meet expectations, which led to restructuring of the company.

Several Swiss biotech companies received awards in 2020:

- Great Place to Work® certified Selexis as a Best Workplace in Switzerland for the third consecutive year
- AC Immune won a prestigious award to develop a “Game-Changing” Parkinson’s diagnostic tool

- InSphero’s InFloat™ Microtissue Shipping System won the coveted Red Dot Best of the Best Award for product design
- ETH Zurich spin-off deep CDR Biologics won CHF150K from Venture Kick
- Alithea Genomics, LifeMatrix Technologies and MimiX Biotherapeutics each won CHF 40K
- CUTISS won the Top 100 Swiss Startup Award 2020
- Madiha Derouazi, founder and CEO of Amal Therapeutics, was among the winners of the EU Prize for Women Innovators 2020
- CRISPR Therapeutics Co-Founder Emmanuelle Charpentier received the 2020 Nobel Prize for Chemistry

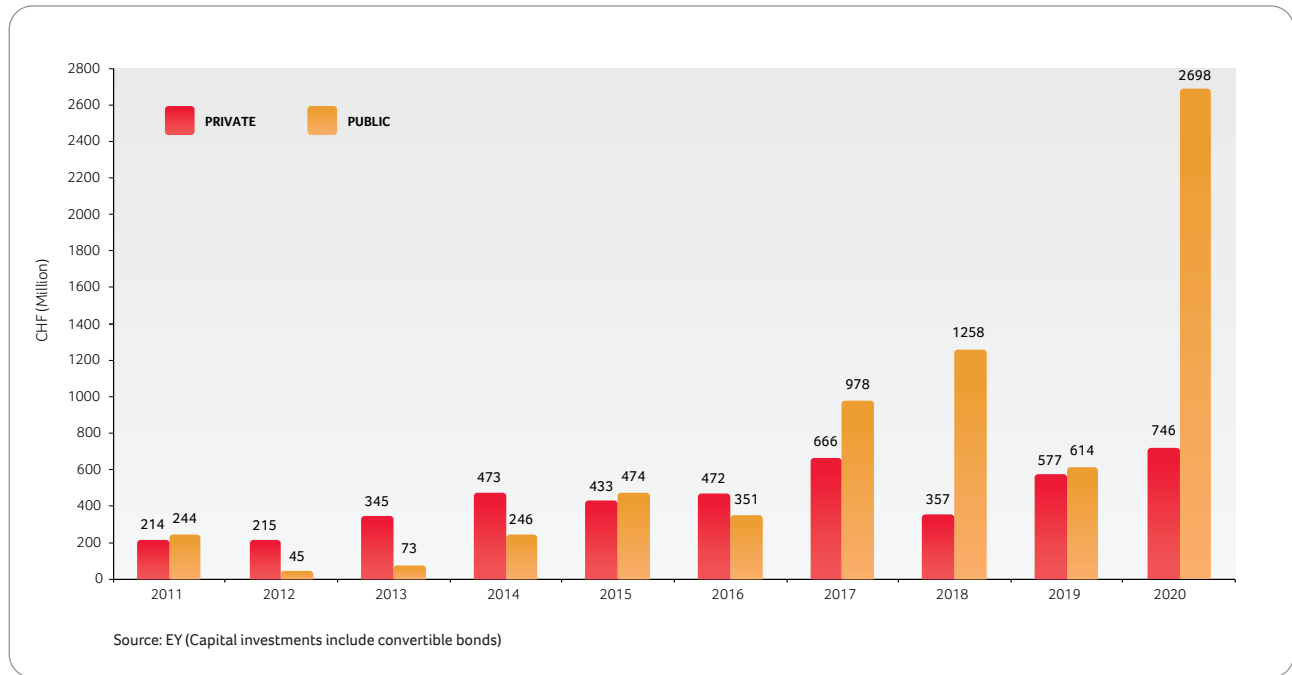
All of these awards are yet another clear indication of the strength of the Swiss biotech sector and a reflection of all of the significant progress made over recent years.

Private & Public Swiss Biotech Regional Financing - 2018-2020



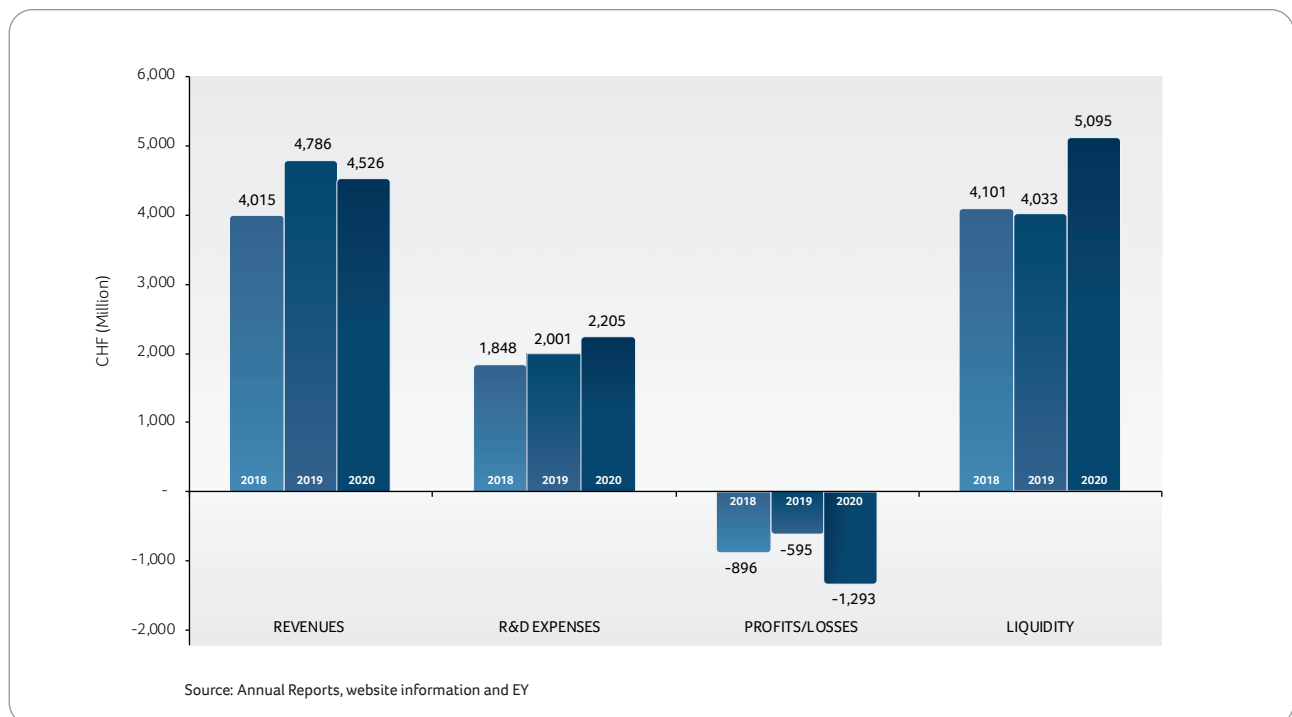
Capital investments in Swiss biotech companies 2011-2020

Private & Public Swiss Biotech Companies



Revenues, R&D expenses, profit/loss, liquidity 2018 - 2020

Total Swiss Biotech Companies

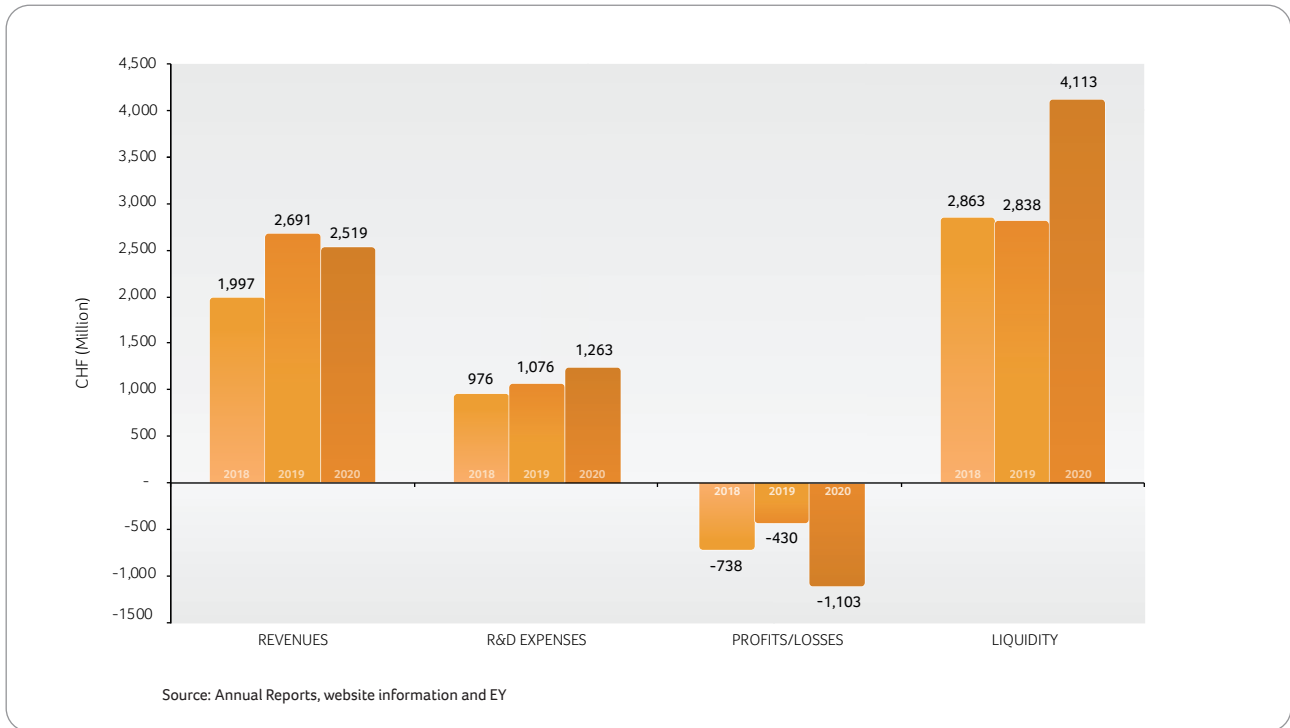


Note: The 2020 data in above tables is based on information that was available up until March 31, 2021. At this time, some of the companies had not yet disclosed their financial figures for 2020. Therefore some figures were carefully extrapolated on the basis of the latest interim data publicly available (i.e. Q3 or Q4 2020).

The year in charts

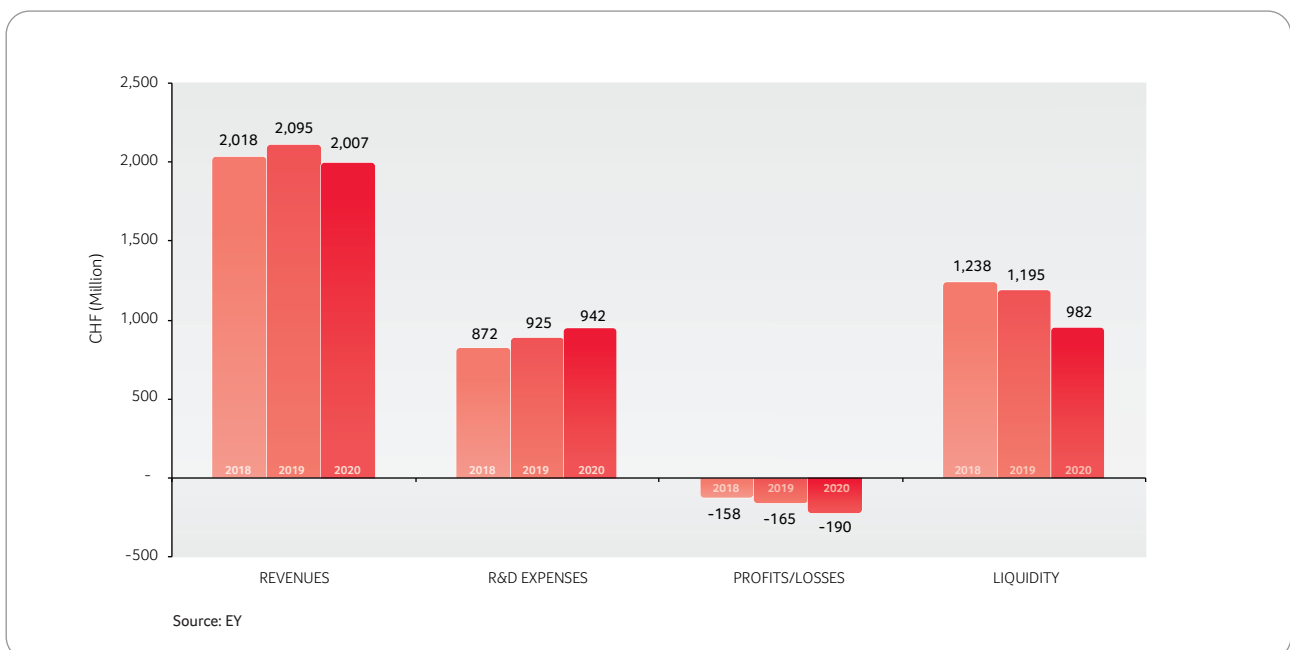
Revenues, R&D expenses, profit/loss, liquidity 2018-2020

Public Swiss Biotech Companies

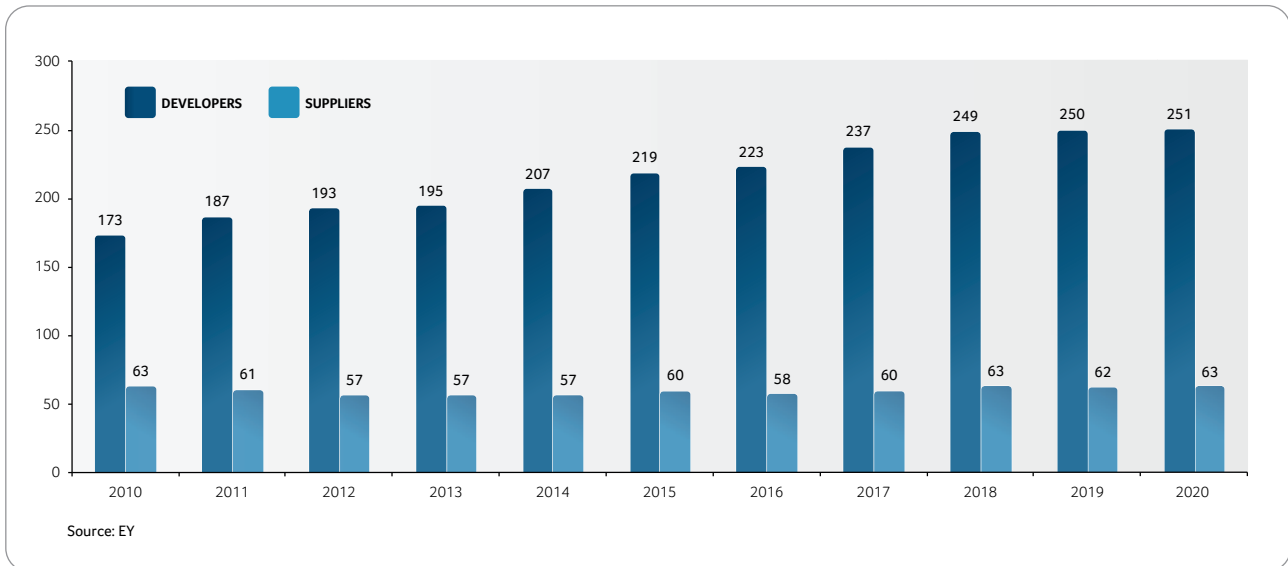


Revenues, R&D expenses, profit/loss, liquidity 2018-2020

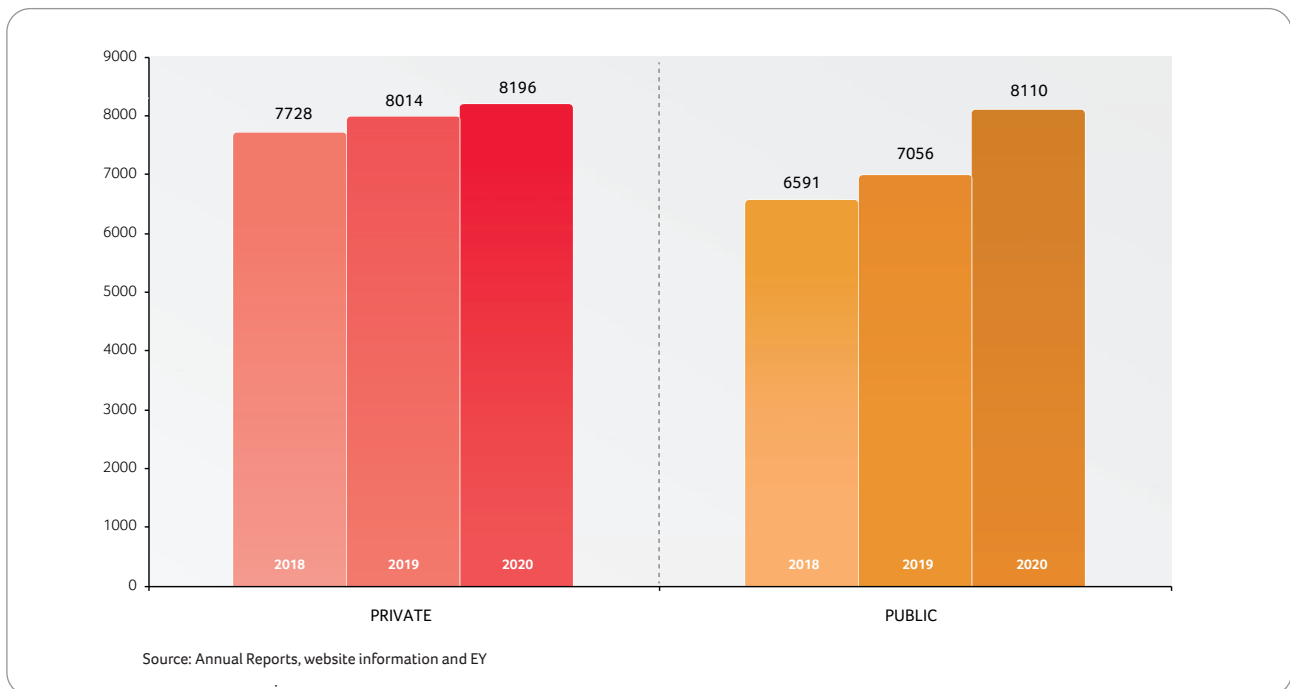
Private Swiss Biotech Companies



Number of Biotech Companies in Switzerland 2010-2020



Number of Swiss Biotech Employees 2018-2020





Jan Lucht

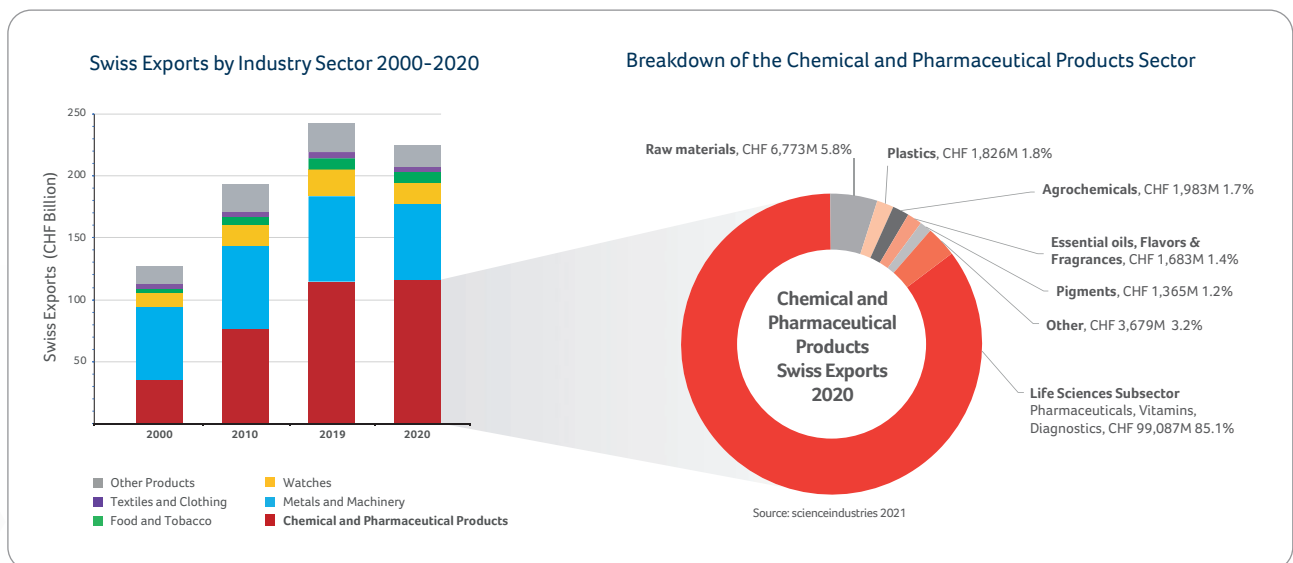
scienceindustries | Head Biotechnology

Swiss life science exports were valued at CHF 99.1B in 2020 and accounted for 44% of total exports. The sector has grown by a factor of 4.5 since 2000, when life sciences accounted for 17% of total exports, making it the strongest single driver of Swiss export growth.

In 2020, the life science, pharma and chemistry sectors achieved a record export value of CHF 116.4B (up 1.6%), accounting for 52% of total Swiss exports. This strong performance was in contrast to an overall 7.1% decline in Swiss exports due to the COVID-19 crisis. The dominant contribution came from the life sciences subsector (pharmaceuticals, vitamins and diagnostics) with a value of CHF 99.09B. This subsector alone represented a 44% share of total Swiss exports in 2020, a strong expansion from its 17.4% share in 2000.

The life sciences subsector comprises a significant proportion of biopharmaceuticals and biotech products. More than a third of these subsector exports are derived from immunological products and monoclonal antibody therapeutics that showed an especially strong performance in 2020 with exports of CHF 36.99B (+8.3%).

While total Swiss exports grew by 78% from 2000 to 2020 (from CHF 126.55B to CHF 225.07B), the life science subsector's contribution increased by 349% in the same time (from CHF 22.07B to CHF 99.09B), making it the strongest driver of Swiss export growth and continuing its positive contribution even in the difficult year 2020. Favorable framework conditions in Switzerland for high-tech industries like the biotech sector, as well as preparedness and agility of companies in challenging times, support this strong economic development.



Swiss export statistics according to industry sector demonstrate the lead of the chemistry, pharma and biotech industry (scienceindustries/Federal Customs Administration 2021). The life science subsector alone contributed 44% to the total Swiss export value.



How Swiss basic research has enabled us to respond to COVID-19



Florian Fisch

Swiss National Science Foundation | Science editor

Researchers were at the forefront of efforts to combat the current pandemic. And they did not have to perform from a cold start. Thanks to the continued funding of basic research, experts with the right knowledge were ready to react swiftly.

On December 31 2019 the World Health Organization (WHO) was informed of a “pneumonia of unknown cause” in the Chinese city of Wuhan. Just one week after that communication, a scientific article identified a new coronavirus as the cause of this respiratory disease. The sequence was already determined and found to be closely related to the known viruses causing Sars and Mers.

On March 16 2020 the first person was vaccinated in a clinical trial using an RNA-agent produced by the US start-up Moderna. Only eight months later, two manufacturers had already announced very promising results from Phase III trials, and on December 9 the first person in the UK received the first regular jab. And this was just the beginning.

“Technologies developed by scientists in Switzerland have been crucial in the fight against COVID-19, including cloning the virus, cryo electron microscopy to visualize the spike proteins, and the use of radioactive molecules that bind to receptor proteins to investigate how the virus enters the host.”

There is justified hope that in 2021 our fatigued society can once again have close contact, throw parties and organize events with large crowds. This unprecedentedly fast vaccine development was made possible by an international scientific community that was well organized and trained. There were epidemiologists, virologists and infectologists who knew how to deal with RNA-viruses and diseases.

Such an achievement was inconceivable at the time of the Spanish flu just 100 years ago. People did not even know it was a virus. This time, with prior knowledge about viruses, researchers could change priorities quickly and use their expertise on the new SARS-CoV-2. Knowledge was made available to other researchers openly and quickly on preprint servers.

By supporting research initiatives to promote basic research, SNSF has made an important contribution to the ability of the scientific community to respond to the pandemic. When the outbreak was declared a “public health emergency of international concern” by the WHO, the SNSF reacted quickly and mounted two new extraordinary research programs, a special call on coronaviruses (CHF 12M, 45 projects, March 2020) and the National Research Program COVID-19 (CHF 20M, 28 projects, April 2020). In addition, it participated in financing the Swiss arm of the WHO solidarity trial.

Examples of research contributing to tackling the pandemic:

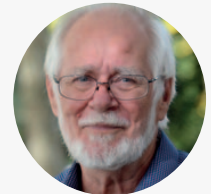
Prior research that expedited the global response

Ready to visualize the spike

The spikes of the new coronavirus are well known, even to children. These proteins bind to a receptor on human cells which, in effect, opens the door for the virus. However, antibodies that bind to the spike can prevent this occurring. It is therefore important to know the 3D structure of the spike protein to target the development of treatments against the disease.

On February 19 2020, even before the first wave of infections hit Europe, the first structure of SARS-CoV-2 spike protein was published. This was made possible by a technique called cryo electron microscopy. By freezing the biological samples to below minus 150° Celsius those structures can be observed in their natural environment and shape. The method was invented by the Swiss structural biologist and Nobel laureate Jacques Dubochet, former professor at the University of Lausanne.

Another researcher, Maximilian Sauer, a former PhD at ETH Zürich and now postdoc at the University of Washington in Seattle (USA) has followed in the footsteps of Dubochet. He was visualizing the spike proteins of Mers-Cov, a virus causing a similar disease, back in 2018 when not many people were interested in the disease. Today he is focusing on designing antibodies that bind to all sorts of spike proteins - and may soon neutralize several coronaviruses.



Jacques Dubochet



Maximilian Sauer

Experts who were ready from day one

Cloning the virus

Knowing how to handle viruses is not something that can be developed in days or weeks. And every virus has its own peculiarities. Volker Thiel is the Swiss expert on these RNA-viruses out of passion, and has been studying them for over 20 years. With his team from the Institute of Virology and Immunology at the University of Bern, he has been studying the functioning and replication of coronaviruses.

After the start of the pandemic they were able to create a synthetic clone of the new SARS-CoV-2 virus within one week using a special genomics platform. This meant that just one month after the sequence of the virus was known, it could be reproduced synthetically. The ability to obtain viruses without the need for probes from infected people, and to produce these in large quantities was a crucial step in efficient vaccine production. It also helped the development of new drugs against the infective agent, and allowed variants of the virus to be characterized. Due to his knowledge about diseases that are transmitted from animals to humans, Thiel is involved in six separate research projects – two as leader – funded by the SNSF relating to the SARS-CoV-2-outbreak.



Volker Thiel

Vaccines and immunity

Just having a clever idea on how to produce a new vaccine is not enough. The product has to be proven to be effective and for this to happen it has to go through different testing phases: from preclinical studies of the biological mechanism to determining safety, the correct dosing and efficacy. Once approval by drug regulators has been given, the long term effects of large-scale application have to be monitored.

One of the Swiss experts in this field is Claire-Anne Siegrist from the University of Geneva. The vaccinologist and paediatrician was involved in clinical trials of the Ebola vaccine, approved at the end of 2019. She is still studying vaccine mechanisms through a systems biology approach supported by the European Innovative Medicine Initiative. And, she is collaborating closely with the WHO and is experienced in answering questions of those who hesitate to get vaccinated.



Claire-Anne Siegrist

In March 2020, Siegrist and colleagues from the University of Geneva started a project funded by the SNSF that plans to study 50 COVID-19 patients and 200 close contacts to understand what factors contribute to the severity of the disease and the duration of the immunity.

How Swiss basic research has enabled us to respond to COVID-19

CONTINUED

New ongoing COVID-19 research

Where can the virus enter the host?

It is important to understand which organs can be attacked by the new coronavirus. It enters the host cells by binding with its spike protein to the angiotensin converting enzyme 2 (ACE2), which occurs on the surface of many cells. Knowing where, when and how much of ACE2 is present in different patients could help improve diagnoses to determine the risk of the infection in advance.

Cristiana Müller from the Paul Scherrer Institut in Villigen and colleagues from the ETH Zurich are producing radioactive molecules that bind to ACE2-proteins and that can be traced using PET-scanners. The next big step will be preclinical evaluation that includes tests in mice.



Cristiana Müller

When to treat aggressively?

Most cases of infections with the new coronavirus do not cause much harm. But some people get severe flu like symptoms, and some unlucky ones need hospitalization, intensive care and even ventilation. In order to investigate the variation in immune response in different individuals, Giuseppe Pantaleo and colleagues from the University hospital CHUV in Lausanne set out to characterize immune responses.

Their hypothesis was that severe cases are due to a dysregulated immune system, which could be detected early in the progression of the disease. They take blood samples and biopsies from patients to analyze cellular, genetic and biochemical profiles that help to distinguish the different kinds of patients. The results could serve to decide when intensive treatment is necessary and even who should be prioritized when receiving a vaccination.



Giuseppe Pantaleo

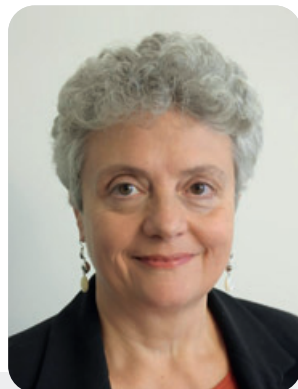
For those wishing to learn more, the Swiss COVID-19 Project Registry offers an overview of research on COVID-19 funded by the SNSF, Innosuisse, or within the European Framework program Horizon 2020 with Swiss participation.

For more information please visit: <https://data.snf.ch/covid-19>

“When the outbreak was declared a “public health emergency of international concern” by the WHO, the SNSF reacted quickly and mounted two new extraordinary research programs - a special call on coronaviruses and the National Research Program COVID-19. The SNSF also participated in financing the Swiss arm of the WHO solidarity trial.”



Global Innovation Index 2020: how patents contribute to this ranking



Christian Moser,
Anna Maria Villa

Patent Experts

Debora Frei

Economist

Swiss Federal Institute
of Intellectual Property

Switzerland consistently tops the GII ranking for innovation and is also a leading country of origin for high quality biotech patents. Although the latter only account for a small proportion of Switzerland's patent portfolio, they are widely regarded as the 'jewels in the crown'.

High quality patent output helps maintain Switzerland's top ranking in Global Innovation Index

Switzerland's top ranking in the Global Innovation Index (GI) over the last ten years results from many different aspects of fostering and implementing innovation. Patents represent only one of many quantifiable parameters of the GI, but the GI ranking and the patent metrics show a remarkable overlap: 15 countries rank among the top 20 in both patent metrics and GI. The overall patent landscape is similar to the 40 times smaller biotech patent landscape. The latter reveals an ongoing race between the leading countries of origin towards higher quality. Denmark and Switzerland are in the lead, closely followed by other European countries and emerging origins of high quality biotech inventions with lower rankings in the GI 2020, such as India or Australia. Switzerland excels in both high patenting activity evident from the GI and excellent patent quality, based on the patent metrics, particularly so in the biotech sector.

Switzerland heads Global Innovation Index for tenth consecutive year

The GI is a ranking of the world's economies according to innovation capability. The GI 2020 comprises 80 different parameters, which are summarized into two main indices, input and output score. The average of these two indices then forms the overall GI score. Published annually, the GI has evolved into an accepted benchmarking tool for measuring innovation. Since 2011, the GI has continuously ranked Switzerland first (Figure 1). Apart from Switzerland and Sweden, there have been considerable changes in the top 10 rankings over this period. Switzerland's top place results from high rankings across all 80 parameters.

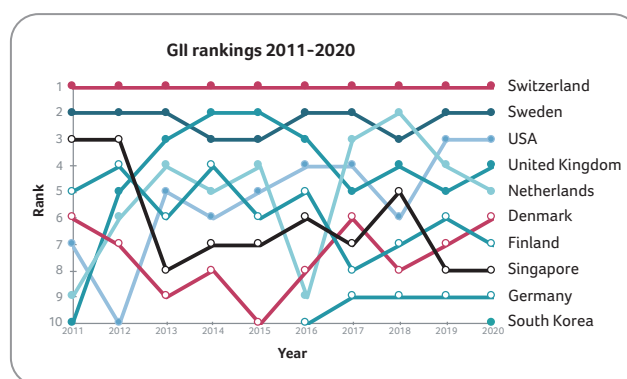


Figure 1: GII Rankings 2011-2020

Switzerland has consistently ranked nr. 1 since 2011

The GI was initiated in 2007 by Cornell University in collaboration with INSEAD and the World Intellectual Property Organization (WIPO) and covers 131 countries representing 93.5% of the global population and 97.4% of the world's gross domestic product (GDP).

Global Innovation Index 2020: how patents contribute to this ranking

Both quantity and quality count

The GII output score (Figure 2, left panel) comprises 27 parameters, including intellectual property rights. While the GII mostly relies on quantitative patent data - i.e. number of national and international applications - the Patent Asset Index (PAI) combines patent quantity and quality, represented by the bubble sizes (Figure 2, right panel). The comparison reveals that 15 of the top 20 GII countries also belong to the top 20 patent inventor countries based on their PAI (Figure 2, right panel). In addition, the top five countries according to GII - Switzerland (CH), Sweden (SE), United States of America (US), United Kingdom (GB), and The Netherlands (NL) - all cluster in the top right quadrant, the high quality sector of the patent landscape.

According to the respective GII 2020 sub-indices, standardized by gross domestic product PPP\$ (purchasing power parity) GDP, Switzerland ranks first for number of patents and third for both PCT (Patent Cooperation Treaty) applications and scientific publications.

In contrast, the Patent Asset Index (PAI) metrics include both quantitative and qualitative aspects, regardless of GDP or population. At the end of 2018, the patent portfolio invented in Switzerland ranked 11th with 1.6% of the global portfolio value. In biotech, Switzerland was more prominent, ranking 8th, and accounting for 4% of the global portfolio value.

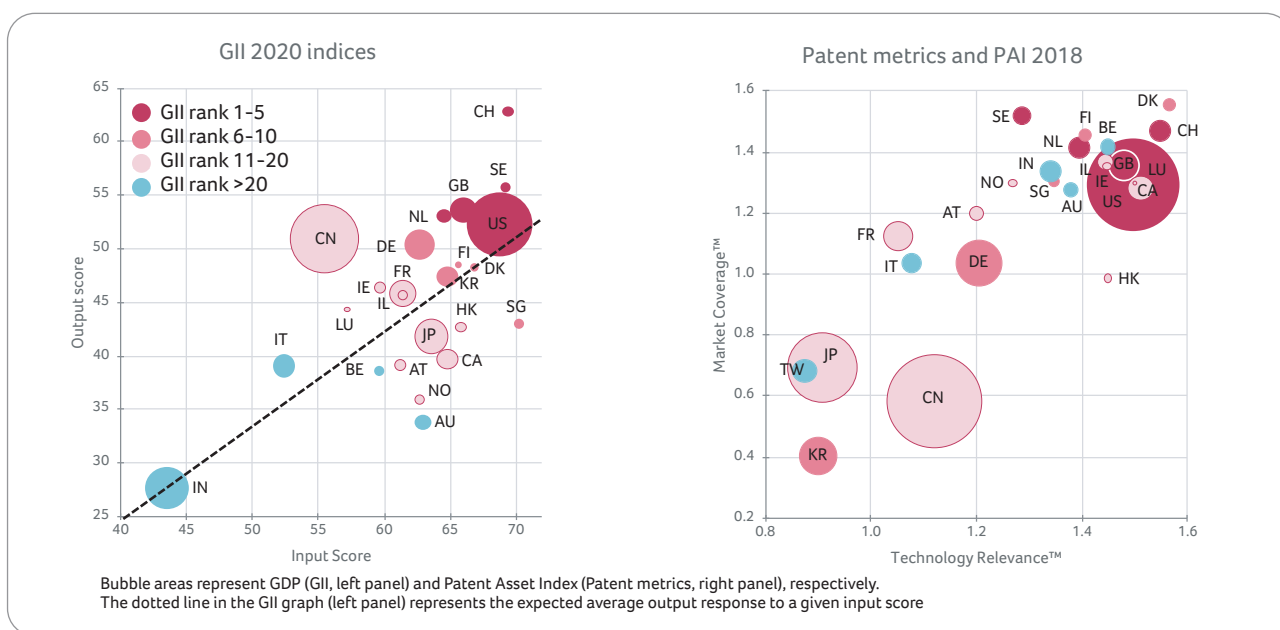


Figure 2: Global Innovation Index (GII) and Patent metrics

Switzerland and China stand out as the countries significantly exceeding their predicted GII output score (left panel). The top five GII 2020 countries (left panel) also locate in the sweet spot of the Patent Metrics (right panel). These are Switzerland (CH), Sweden (SE), United States (US), United Kingdom (UK), and the Netherlands (NL).

Because the GII 2020 relies mostly on data from 2018, the patent metrics also show the data of 2018. The Patent Asset Index (PAI) includes all active patent families - i.e. all patent families pending or in force at a given time point, irrespective of their filing year. Similar PAIs can result from small portfolios of high quality, as exemplified by Switzerland (CH), or from larger portfolios of lower average quality such as South Korea (KR). The two countries have similar PAI bubble sizes but are located in opposite sectors of the patent metrics graph. The patent metrics graph (right panel) allocates the countries' portfolios based on their average patent quality parameters, i.e. Technology Relevance (x-axis, based on citations of the respective patent as state-of-the-art) and Market Coverage (y-axis, reflecting the GDP-adjusted market size protected by the respective patent family).

A closer look at quality

The patent metrics parameter Competitive Impact (CI) focuses on quality only (Figure 3). It represents the average quality index of a given active patent portfolio, independent of the number of patents included therein. Based on the CI, Denmark ranks first, closely followed by Switzerland, both for the entire patent portfolio and for the biotech subset. Without exception, all countries show higher CI values for their biotech patents than for their entire portfolios. The patent metrics do match the GII rankings when it comes to the top ranking countries, but some important countries - such as Belgium, India, or Australia - are not in the top 20 of the GII. Remarkably, given its ranking of 48 in the GII, India ranks third in biotech CI, and 10th in the CI for all patents.

Thus, when focusing on patent quality and on the subset of biotech patents, discrepancies between the GII ranking and patent metrics become visible. Nevertheless, many of the inventor countries with high patent quality indicators still rank high in the GII, despite its reliance on quantitative rather than qualitative patent data.

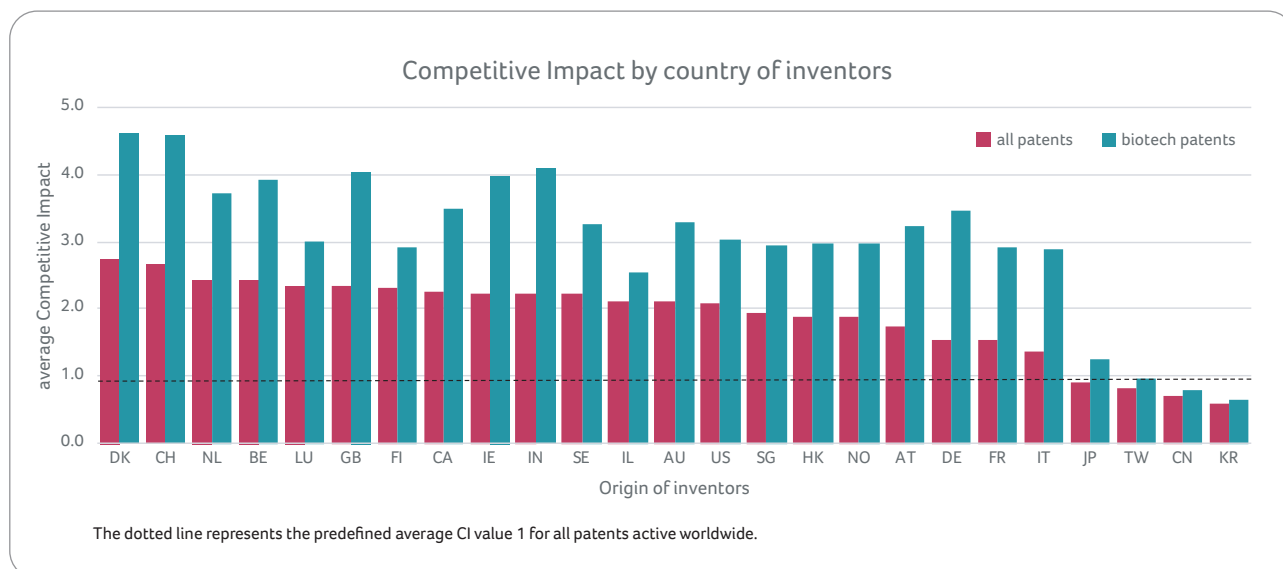


Figure 3: Competitive Impact by country of inventors:
Denmark and Switzerland rank first, for both biotech and all patents

Competitive Impact (CI) by country of inventors (reporting Dec 2018). The graph shows the same 25 countries (top 20 GII and/or top 20 Patent Asset Index) as depicted in Figure 2. The order from left to right reflects the CI ranking based on all patents. The CI for a given patent family results from multiplication of the values for "Technology Relevance" and "Market Coverage" of the patent family. The "Patent Asset Index" is the sum of the CI values of all patent families included in a given portfolio.

The biotech patent landscape is similar to the overall patent landscape

At the end of 2020, only 2.7% of all 13.2 million active patents qualified as biotech patents, accounting for 4.6% of the total PAI. Nevertheless, the biotech patent landscape is similar to the overall picture. Both landscapes reveal a cluster of European countries alongside India, the USA, Canada, Australia, which combine high Technology Relevance (TR) and high Market Coverage (MC). Again, Denmark and Switzerland are sharing the lead (see Figure 2).

However, the biotech landscape features distinctly higher values on both the TR and MC axes, consistent with the higher average CI of biotech patents shown in Figure 3. Additional information on the biotech patent landscape is available in the online version of this article, including a closer look at the dynamics of the biotech patent landscape over the past 20 years.

Biotech is providing the jewels in Switzerland's patent portfolio crown

In summary, Switzerland's top ranking in the GII is the result of consistently high scores across all 80 parameters considered. Although the impact of patenting activity on the overall GII score of a country is limited, in the case of Switzerland, the high patenting activity combined with excellent quality contributes to the outstanding GII innovation output index.

Biotech patents only account for a small fraction of all patents, with limited impact on the overall portfolio, and an insignificant influence on the GII score of an inventor country. This finding is substantiated by India, Belgium, and Australia, which are important countries of origin for biotech patents, even though they are not ranked among the top 20 in the GII. That said, biotech patents are nevertheless the "jewels in a crown" for many patent portfolios, in particular for countries like Denmark and Switzerland.

COVID-19 disclaimer

The coronavirus pandemic is boosting innovation but most patent applications are not published until 18 months after filing. Thus, analysis of coronavirus-related patenting must wait until complete data is available.

References/further reading

Global Innovation Index 2020: <https://www.globalinnovationindex.org>
WIPO Intellectual Property Right statistical data:
<https://www.wipo.int/ipstats/en/>
Patent Asset Index metrics by PatentSight:
<https://www.patentsight.com/patentsight-patent-asset-index>

Biotechnet: public-private partnerships generate prompt response to COVID-19



Laura Suter-Dick

Biotechnet Switzerland | President
School of Life Sciences, FHNW | Professor for Molecular Toxicology

The global pandemic has put society under incredible pressure, generating unexpected challenges in the health sector and massive repercussions in the global economy. But the partnerships between research organizations and industrial partners in the biotech sector have provided some timely solutions.

Throughout 2020, Biotechnet Switzerland continued to work closely with the Swiss Biotech Association to facilitate advances in biotechnology. When it comes to networking between the industrial sector and Swiss universities, particularly those in applied sciences, and research and technology organizations, we can make things happen.

Links that ignite innovation

The competence center and Biotechnet platform TEDD (Tissue Engineering for Drug Development and Substance Testing) hosted by the Zurich University of Applied Science (ZHAW), promotes the application of 3D organotypic technologies for drug discovery and therapy development.

In October 2020, the TEDD annual meeting was dedicated to human microphysiological systems (MPS). Many of the scientific talks addressed the SARS-CoV-2 pandemic. This was a natural development because *in vitro* human cell-based models can support research on virus infection, proliferation and treatment. The discussions highlighted the readiness of the MPS for industrial implementation. Not only can MPS have a major impact in reducing the number of animal experiments and supporting the 3Rs (Replacement, Reduction and Refinement of animal experimentation), human-based MPS can often lead to more relevant results than experiments with rodents. This is particularly true regarding research on SARS-CoV-2, as viral infections are prototypically species-specific.

POC diagnostics: fast and furious

Biotechnet's thematic *in vitro* diagnostics platform (TP IVD) promotes technological innovation in the area of *in vitro* and point-of-care (POC) diagnostics by providing access to a network of experts. Better POC diagnostics are critical in tracing SARS-CoV-2 - a mobile, invisible and potentially deadly enemy. POC plays an important role, complementing central testing facilities that may be confronted with capacity and logistical challenges. Generating cost effective POC diagnostic systems however, requires an interdisciplinary approach combining elements from biology, chemistry, instrumentation, software engineering, and digitalization.

The 3rd Swiss Symposium in Point-of-Care Diagnostics, held in October 2020, provided an excellent way to bring together the know-how of key players including industry, medical and research organizations. It offered an opportunity to share scientific advances, end-user experiences, customer needs, regulatory requirements, and technological possibilities. The event was organized by Biotechnet's TP IVD co-led by representatives from the University of Applied Sciences Western Switzerland (HES-SO) and Swiss Center for Electronics and Microtechnology (CSEM). This multi-sector ecosystem facilitates a smart "design thinking" process that promotes the development of customer-centered products.

Topics addressed included CRISPR/Cas9-based genetic engineering (research area awarded the 2020 Nobel Prize in Chemistry), blockchain technology, smart phone apps, immunology/immunity, and ergonomics. One of the hot topics for the next symposium, planned for October 21 2021 in Davos, is the role of POC diagnostics in the context of global vaccination programs.

Turning ideas into solutions

The DAVINCI consortium, including CSEM and FHNW (University of Applied Sciences North Western Switzerland) from Biotechnet, is funded by the Botnar Research Centre for Child Health. Its objective is to develop and validate a simple, inexpensive, and accurate rapid-diagnostic test device for antigens and antibodies in saliva.

In Europe, validated COVID-19 tests require nasopharyngeal swabs (for antigen detection) or blood samples (for antibody detection). This project aims to develop the first approved home-use rapid diagnostic tests for COVID-19 for non-trained users. It will combine an antigen-based test for early diagnosis of COVID-19 with an antibody test to evaluate the protection of individuals. The ongoing research showed that IgG (immunoglobulin G) and IgA (immunoglobulin A) anti-SARS-CoV-2 antibodies can be detected in saliva, and led to proprietary technical improvements to boost the sensitivity of lateral flow assays. In the future, the test kit could be adapted to other infectious diseases such as influenza.

Another example of agile innovation is the collaboration since January 2021 between the School of Life Sciences (FHNW) and Biolytix AG. The two have partnered to ensure the canton of Baselland can perform PCR-based COVID-19 tests in saliva for a large number of students. Similarly, a pilot program testing thousands of school children in Baselland started in February. Mass-testing is an urgent need in-line with the Swiss governmental policy and these partnerships are making it possible.

Intelligent textiles for masks

SARS-CoV-2 increased the demand for antimicrobial impregnation products developed by the company HeiQ Materials AG. This is a textile technology company spun off from the Swiss Federal Institute of Technology in Zurich (ETH). HeiQ Viroblock NPJ03 is an antiviral and antibacterial textile treatment based on a unique combination of silver and vesicle technologies designed to reduce viral and bacterial infectivity.

Thanks to the collaboration with the Process Technology Center of FHNW, HeiQ was able to ramp up production to satisfy global demand within just one month. HeiQ Viroblock material technology has been adopted by more than 100 mask producers world-wide. The company is now providing safe protection to millions of people around the globe and in December 2020, HeiQ commenced trading on the London Stock Exchange.

The effectiveness of HeiQ's antibacterial and antiviral textile treatment has allowed the technology to be adopted by more than 100 mask producers worldwide.

Real-time remote patient monitoring

COMO is a Swiss-Italian project with the participation of CSEM in Neuchatel. It aims to develop real-time remote monitoring of patients who test positive for COVID-19. This service enables patients to stay at home while being remotely monitored by physicians.

The starting point for the project was an existing wearable system consisting of two sensors attached to a chest strap, equipped with rechargeable batteries, bluetooth modules, and electronic processors. Data are collected on mobile devices (the patient's smartphone), aggregated with geo-referenced data and uploaded to an IT cloud platform.

The main objective of the pilot is to avoid the hospitalization of COVID-19 patients, as it enables physicians to efficiently monitor the evolution of patients' symptoms and to react if critical parameters exceed predefined threshold values. The system is currently undergoing a first clinical trial at Luigi Sacco University Hospital in Milan.



Source: HeiQ

Testing for previous infection

Swiss start-up Adamant Innotech and CSEM are developing a rapid, highly sensitive serological test to determine previous infection with the SARS-CoV-2 or other viruses. Adamant Innotech specializes in miniaturized optical technologies and has commissioned CSEM to work on a new test that detects, among others, the antibodies binding to the protein of SARS-CoV-2 in a blood sample.

In the foreseeable future, a first product should be available to the Swiss and Chinese markets. "Similar methods are being deployed in hospitals, but we offer a high-performance and competitive Swiss solution, which allows a wide range of tests to be carried out simultaneously," says Xiaoming Tang, managing director of Adamant Innotech.

The new biosensor, based on mature optical microarray technology, will provide results within two hours after simultaneously probing up to 20 different types of antibodies and tracing for various past infections, such as COVID-19, influenza or SARS.

Academia and industry exchanges: a two-way flow

Public-private partnerships not only promote research activities and collaborative projects, but also allow the bidirectional flow of skills and knowledge between academia and industry, ensuring the availability of optimally qualified personnel to fulfil the needs of the Swiss economy.

One such example is the recently established collaboration between Lonza and HES-SO in the context of the Ibex® Biopark in Valais (currently manufacturing the Moderna vaccine). It addresses the availability of a qualified workforce in the field of biotechnology, and in specific areas of research focus.

Research on digitalization, automation and control of biotechnology processes will be performed in a joint research-laboratory. HES-SO will be key in the continuing education of Lonza personnel as a preferred partner and will, in turn, profit from industrial know-how that can be transmitted to the

students. In addition, a joint marketing strategy will enhance the recruitment of students, who will in time become highly qualified personnel. From many aspects, a win-win situation!

The selected examples in this brief overview demonstrate how Biotechnet Switzerland is making a difference.

Our mission is to remove any bottlenecks in the development of innovations - and in 2020 we did just that. By providing the links between different individuals and organizations we fired the spark of innovation not only in the development of new technologies, but also in their application to the real-world challenges of the current pandemic.

Networking

Biotechnet Switzerland: <https://biotechnet.ch/>
3Rs: <https://www.swiss3rcc.org/en/>
POC: <https://www.pocdx.ch/>
TEDD: <https://www.zhaw.ch/de/lsfm/forschung/chemie-und-biotechnologie/competence-centre-tedd/>

Selected Innovations 2020

Virablock: <https://heiq.com/2020/04/23/heiq-wacker-fhnw-and-alchemie-form-a-seamless-supply-chain/>

Participants: collaboration between FHNW and HeIQ

DAVINCI: <https://brc.ch/research/davinci/>
<https://www.csem.ch/page.aspx?pid=155121>.

Participants: (Lead: Swiss tropical and public health institute; Members: University of Basel, CSEM, Bioinitials, ETH Zürich, FHNW, Hemex, Effectum Medical)

Mass testing (Saliva-PCR-test):
<https://www.fhnw.ch/de/medien/newsroom/medienmitteilungen/medienmitteilungen-2021/fachhochschule-nordwestschweiz-fhnw-erster-zertifizierter-corona-speicheltest-fuer-studierende-im-kanton-baselland>.

Participants: FHNW and Biolytix

COMO: <https://business.esa.int/projects/como>.
Participants: Vexatec AG (Lead), CSEM and EOS S.R.L, Italy.

Optical sensors: <https://www.csem.ch/page.aspx?pid=154411>.
Participants: Adamant and CSEM

Talent development:
<https://www.hevs.ch/de/hochschule/hochschule-fur-ingenieurwissenschaften/systemtechnik/news/lonza-und-die-hes-so-valais-wallis-schliessen-einen-partnerschaftsvertrag-uber-10-jahre-ab-22990>

Participants: HES-SO Valais and Lonza



Organic chemistry at the crossroads: the untapped potential of industrial biotechnology in Switzerland

Willy Gehrler

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Engineering Sciences
SATW | President



Hans-Peter Meyer

Swiss Academy of Engineering
Sciences SATW | Head, Working
Group Biotechnology

Industrial biotechnology (IB) is much more than green fuel in a dirty economy. It is an indispensable enabling technology and a key industry for the 21st century. It uses the precision and power of biological systems to produce and process materials, chemicals and energy. We expect that at least 20% of all organic chemical products and processes can and will be replaced by biotechnological processes.

One development that triggered this initiative to explore greener options was the loss in manufacturing know-how and production capacities in IB we observed both in Switzerland and other Western countries. This was due to the transfer of processes and technologies for the production of antibiotics, small molecule drugs and their intermediates to low-cost countries with different sustainability standards.

Reversing the offshore trend

Our vision has long been that one key ingredient to reverse the offshoring trend would be the application of biotechnology to organic chemistry and production. This is a key ingredient to meet cost and environmental prerequisites in the manufacturing of organic chemicals including those mentioned above.

In the meantime, COVID-19 has mercilessly revealed a problem, which existed for many years long before the pandemic crisis and is directly related to this transfer of processes and technologies: namely the shortage of drugs in Switzerland, particularly generics and off-patents basic medications [<https://www.drugshortage.ch/>].

IB is an indispensable enabling technology and a key industry for the 21st century. It uses the precision and power of biological systems to produce and process materials, chemicals and energy. IB is also referred to as white biotechnology, as opposed to red biotechnology which describes the biotechnological production of large parenteral proteins such as monoclonal antibodies, tissue engineering or cell therapies.

The global biotechnology market grew to around USD 420B in 2018 and is expected to grow at over 8% CAGR over the next few years. And these figures tend not to include products produced by chimeric (chemical-biotechnological) processes, where biotechnology is only one of several manufacturing technologies used for a given product. It is expected that at least 20% of all (organic) chemical products and processes can and will be replaced by biotechnological processes.

“Ultimately, industrial biotechnology is about improving the manufacturing industry’s performance, energy efficiency and product value and thus yielding viable sustainable solutions to protect our environment.”

Industrial biotechnology is much more than green fuel in a dirty economy

Industrial biotechnology uses enzymes and microorganisms to produce products in many different markets and applications such as small molecule drugs, fine chemicals, cosmetics and personal care, plant protection which all have different economic drivers. Swiss companies, which could exploit the great potential IB is offering, include those producing organic chemicals (Bachem, Clariant, Dottikon, Lonza, Siegfried, Spirochem), plant protection products (Syngenta), flavor & fragrance (Firmenich, Givaudan, Evolva), just to mention a few.

Ultimately, IB is about improving the manufacturing industry's performance, energy efficiency and product value and thus yielding viable sustainable solutions to protect our environment

for yielding intermediates, small molecule APIs, vitamins & nutraceuticals and other products.

And it is needed for many reasons:

- Natural raw materials for the flavor & fragrance sector become scarce due to climate change and overuse.
- The E-factor (kg of waste generated per kg of product) for organic chemical synthesis of fine chemicals in many cases is unacceptably high.
- The increasing complexity of the molecules requires the corresponding new precision tools offered by biotechnology.
- Customers request green products. Sustainable manufacturing and reduction of manufacturing footprints are put in place all over the world.

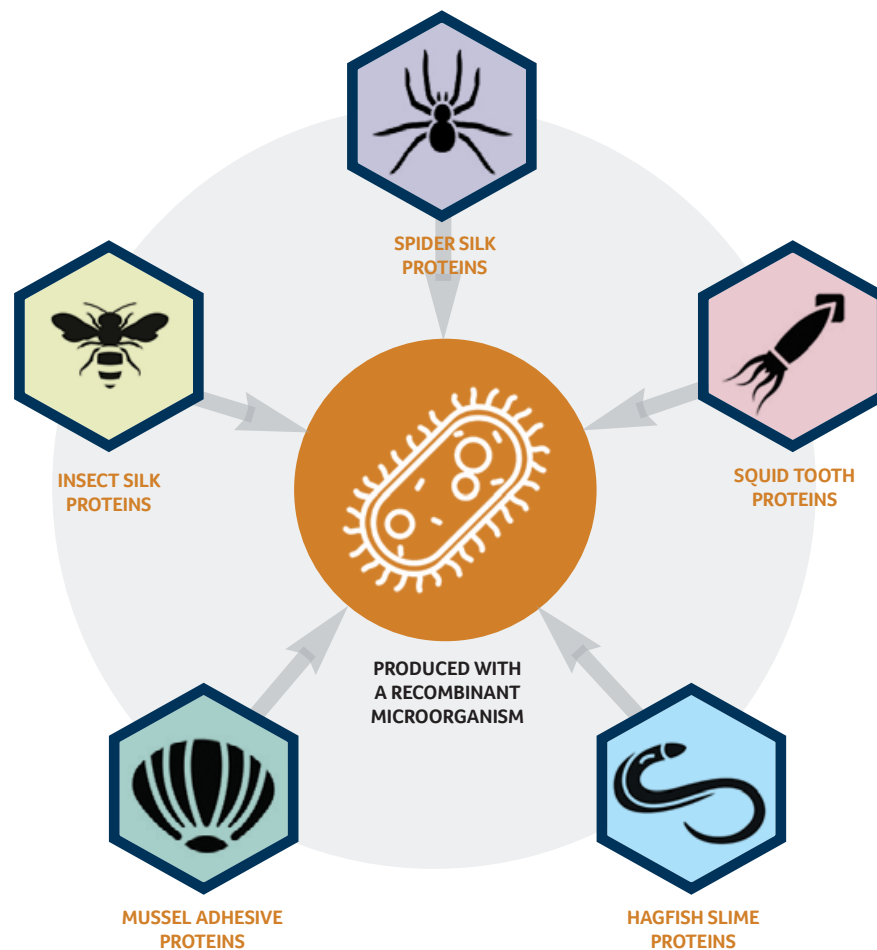


Figure 1: Representative example of an industrial biotechnology (IB) application

IB: The manufacturing of interesting animal protein biopolymers with recombinant microorganisms for high performance applications in medical technology, lightweight constructions, textiles, cosmetics or other industries. But these are very recent projects and with very few products marketed. So far, one of the largest application of these proteins is, surprisingly, in cosmetics. The Swiss flavor & fragrance company Givaudan for example uses silk proteins in hair and skin care products. Or, based on animal protein polymers, novel innovative proteins are designed and produced recombinantly via microbial fermentation to be used as inks for 3D bioprinting (Innosuisse Project: 35545.1 IP-LS –Impulse).

Organic chemistry must be reinvented

Granted, the chemo- and metal catalysis of over twenty marketed small molecule pharmaceuticals, among them blockbuster drugs, was replaced by a chemo-enzymatic synthesis. Granted, the application of biotechnological manufacturing principles for the production of a few selected perfumery ingredients have been realized. Despite these achievements and success stories, the application of biotechnology to chemistry remains a slow and uphill battle.

Finally, how does Switzerland compare in a European or global context? Switzerland is one of the leading healthcare biotech hubs of Europe and the world, while the manufacturing capacity for parenteral proteins such as monoclonal antibodies, vaccines, cell and gene therapies has been steadily expanding. At the same time, Switzerland has established a strong academic basis, globally successful companies and strong associations representing the industry.

Developing the IB sector: a joint effort between the SATW and Swiss Biotech Association

The situation for IB is quite different from the one for healthcare biotech. Unlike most European countries, we do not have an industrial biotech cluster nor a national strategy for IB and the sector is characterized by limited transparency and lack of data. Products from renewable feedstocks are a key driver for pushing IB forward in Europe and access to agricultural commodities at competitive prices is a top priority for IB. However, at this point we can speculate that the sustainable manufacturing of higher value chemicals through IB must have a priority in

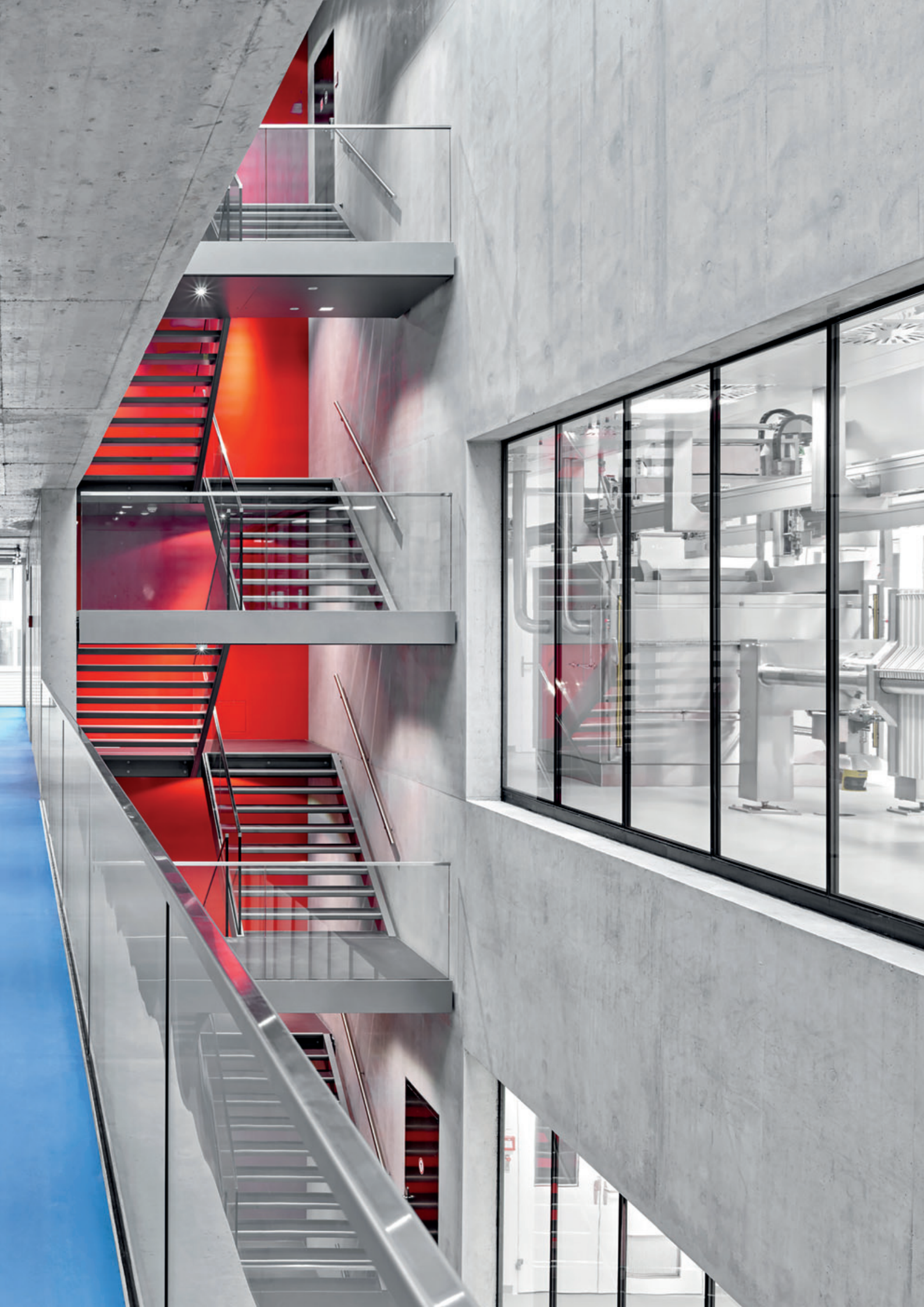
Switzerland. While other applications might not be competitive in Switzerland (e.g. due to the lack of resources or high-cost level), Switzerland can participate in the value creation through licensing deals when the application is implemented successfully in other countries.

To improve the situation the Swiss Biotech Association and the Swiss Academy of Engineering Sciences (SATW) collaborate in a joint initiative called, "Development of Swiss Biotechnology beyond the Biopharmaceutical Sector". The main objective of this initiative is to support the formation of an IB cluster, to connect the stakeholders and to identify the needs and challenges to which Switzerland could contribute innovative solutions. The results of the discussions will be periodically made public on the Swiss Biotech Association and SATW websites. If you are interested do not hesitate to contact us.

The vision and mission of the SATW

SATW is a network of outstanding experts. As engineers and applied scientists, the members of SATW want to contribute to the progress and competitiveness of the Swiss economy. Identifying promising technologies and assembling the best experts to foster innovation and to position Switzerland in a leading role, is one of the key goals of the academy.

With its knowledge, SATW informs politicians and other decision makers in a most neutral way as an honest information broker. In complex fields such as cyber security or the access to data for new applications in artificial intelligence, SATW helps to define nationwide strategies and regulations supporting IB in Switzerland. SATW is also the leading organization for encouraging young women to pursue a career in a technical field.



Fortune favors the prepared: Swiss life sciences in forefront of COVID-19 fight



Jan Lucht

scienceindustries | Head Biotechnology

Swiss companies are making major contributions to the concerted global efforts in the fight against the coronavirus crisis. Vaccine production and reliable COVID-19 testing solutions were set up in record time. Agility, good preparation and a solid basis of experience were decisive.

The global fight against the COVID-19 pandemic greatly increased public awareness of the important role that science, innovation and modern biotechnology play in the pursuit of health and wellbeing. Just eleven months after the beginning of the pandemic, more than 200 promising vaccine candidates were in development and the first vaccination campaigns had started.

This was unprecedented in terms of speed of response; something almost no one would have thought possible just a few months earlier. The rapid development of reliable diagnostic tests to detect COVID-19 infections was also essential. Again, every day counted and the healthcare industry managed to develop, validate, register and distribute test systems within weeks of the COVID-19 outbreak.

A rapid response to new situations and sudden changes, often described as 'business agility', requires structures and modes of operation that allow for fast and flexible adaptation. During the COVID-19 crisis there have been additional challenges in the form of lockdowns and disruptions to global supply chains. Swiss biotech companies have demonstrated they have what it takes when it comes to agility and they are playing a major role in the global fight against COVID-19.

"On May 1 2020 Moderna and Lonza announced a strategic collaboration to enable manufacturing of up to 1 billion doses of the vaccine per year. Lonza acquired equipment and built the production lines in record time. Normally, a project of this size would take at least two years, but due to the urgency of the pandemic the Lonza team managed it in just eight months."

Lonza takes lead in vaccine production

Lonza has its headquarters in Basel and its main Swiss R&D and manufacturing site in Visp (Valais). It is a leading supplier to the pharmaceutical, biotech and nutrition industry and is expanding its global role as a CDMO (contract development and manufacturing organization).

In 2017, Lonza launched the innovative biomanufacturing concept Ibex® Solutions. This is a central pillar in the company's strategic quest to become the world's leading integrated healthcare solutions provider. And Ibex® has subsequently played a critical role in enabling the ramping up of COVID-19 vaccine production.

Ibex® offers highly flexible, modular development and manufacturing facilities across a range of technologies. Customers are supported by innovative business models which make it possible for drug candidates to reach clinics and markets quickly and for supply to be streamlined to better manage demand uncertainty.

Construction of the Ibex® facility started in 2017. Between 2018 and 2020, Lonza invested CHF 1B at the Visp site. "The production facility is as agile, fast and adaptable as the ibex in the Valais mountains," explains Renzo Cicillini, Lonza Site Head in Visp. This broad range of manufacturing technologies, flexibility and rapid scalability proved invaluable when the COVID-19 crisis hit in 2020.



Moderna decides to manufacture in Switzerland

Moderna, a US company with its European headquarters in Basel, was a front runner in the race to produce a global vaccine. The company finalized the design of its innovative mRNA-1273 inoculation just two days after the virus sequence was made available on January 11 2020. Clinical trials, which started in March 2020, yielded encouraging results and large-scale manufacturing options were evaluated. On May 1, Moderna and Lonza announced a strategic collaboration to enable manufacturing of up to 1 billion doses of the vaccine per year.

The agreement is focused on setting up three Lonza production lines in Visp and a fourth line at Lonza's site in Portsmouth, adding to Moderna's own facilities in Norwood in the US. Each line at Lonza is expected to deliver the drug substance for around 100 million doses per year, when operating at full capacity. Lonza acquired equipment and built the production lines in Visp in record time, with operations in Ibex® starting in December 2020, just eight months after signing the agreement with Moderna. At a cost of approximately CHF 210M (one line

financed by Lonza, two lines financed by Moderna), the three lines will come online sequentially during Q1 2021 as planned.

Lonza's global presence and expertise were critical factors when it came to scaling production at unprecedented speed. Normally, a project of this size would take two years, but due to the urgency of the pandemic the Lonza team managed it in just eight months.

Clinical tests had shown a very high efficacy of mRNA-based vaccines, like the Moderna and the similar BioNtech/Pfizer products. Large scale vaccination in the first countries started at the end of 2020, with the vaccine ingredient produced by Lonza playing a key role in controlling the pandemic.

To the same end, Lonza is also collaborating with other companies developing vaccines and therapies, including Altimmune for a potential intranasal vaccine as well as AstraZeneca and Humanigen, developing antibody therapies currently in clinical studies. Meanwhile, the Ibex® activities in Visp are being further expanded with biotech projects outside of the COVID-19 response.

Roche enables first commercial COVID-19 test

Testing is critical when it comes to correct diagnosis of patients and the provision of the most appropriate treatment. During a pandemic like COVID-19, the availability of diagnostic tests is also indispensable in identifying virus carriers and thereby limiting further spread of the disease.

The first PCR detection protocols, developed in January 2020 after the SARS-CoV-2 genetic sequence became available, helped to fight the first wave of infection but were often time-consuming and not always reliable. It was therefore a major step forward when Roche received the first authorization for a commercial PCR test for the virus back in March last year. The protocol runs on Roche cobas® analyzers that are widely used in diagnostic labs all over the world. It allows for the automatic, high-throughput analysis of large numbers of patient samples and gives a reliable result in a few hours.

It took just six weeks from the start of the project to the gaining of regulatory approval. This is lightning speed when compared with the 12-18 months typically required for regular diagnostic tests. Roche Molecular Diagnostics, a pioneer and technology leader in the PCR field, was able to move so quickly because of its huge technical experience and good collaboration with regulatory authorities.

Roche quickly ramped up production capacity to provide millions of tests per month, thereby providing a key component in the global fight against the virus. In May 2020, Roche also received authorization for its COVID-19 antibody test and followed up in September 2020 with a rapid antigen test for ongoing infections that gives results in just 15 minutes.

To support COVID-19 therapeutic solutions, Roche has partnered with Regeneron in August 2020 to produce and provide the antibody combination REGN-COV2 for world markets outside of the US. It tests existing compounds from its portfolio for new uses as COVID-19 therapeutics, and works closely with partners to develop and test novel therapies.

Engagement by Swiss life sciences

Other companies are actively engaged in pushing back the virus. Novartis is supporting numerous own and external trials to reprofile existing own pharmaceuticals for the treatment of COVID-19. In October 2020, it announced a collaboration with Molecular Partners to develop DARPIn® treatments based on a novel class of protein therapeutics (see interview on page 38). In November 2020 an exclusive worldwide license and collaboration agreement with Mesoblast to develop, commercialize and manufacture remestemcel-L for the treatment of acute respiratory distress syndrome (ARDS), including that associated with COVID-19, was announced. Furthermore, immunologists from the Novartis Institutes for BioMedical Research (NIBR) made important contributions to understanding the pathology of COVID-19.

Sandoz decided to ramp up its European manufacturing capacities for antibiotics and committed for a long-term presence, thus contributing to the safety of supply and fighting possible drug shortages in a field so important in the treatment of co-infections. Janssen Vaccines in Bern, part of the Johnson & Johnson group, is playing an important role in the development of a vaccine candidate that entered Phase III studies in September 2020. Bachem expanded its collaboration with Axon to provide material for a promising peptide vaccine. And companies active in the nutrition field, like DSM, intensified their work on the connection between healthy nutrition and an active immune system.

These are just some of the contributions from Swiss life science companies to help control and eventually subdue the pandemic. Preparedness and a fast and flexible response were essential for an agile reaction to this critical situation. The response to COVID-19 has further highlighted the importance of efficient national and international collaboration, streamlined and pragmatic authorization processes, maintaining supply chains and the exchange of information to master the challenge.

Swiss biotech innovation: global power and impact through diversity

Michael
Altorfer
Swiss Biotech
Association | CEO



Marta
Gehring
Swiss Biotech
Association | Western
Switzerland & Special Projects



The Swiss biotech ecosystem's response to the COVID-19 pandemic was swift and encompassing. From the cloning of the virus, to the repurposing of established drugs and the development of COVID-19 specific diagnostics, therapeutics and the manufacturing of vaccine candidates, Switzerland is playing an important role in the global effort to combat the pandemic.

Key to this active role of Switzerland is the country's all-round life science expertise based on a thriving diversified ecosystem that delivers innovation, power and enables impact on a global basis. This ecosystem facilitates the integration of basic science and research in both established and new areas such as gene editing, cell-based therapies and artificial intelligence. At the same time, it can rely on decades of infrastructure development and global manufacturing expertise and distribution power.

Basic science

Early in March 2020, a Swiss high security lab in Mittelhäusern near Bern was set up to produce the first synthetic clone of SARS-CoV-2. This allowed researchers to study the importance of its individual genes with the objective of identifying mechanisms to weaken the virus and hinder its progression. This accomplishment received worldwide attention with labs and companies the world over requesting the clone to support their research.



Just two months after the discovery of the virus, American scientists were able to reproduce a 3D image of SARS-CoV-2's spike glycoprotein protein using the cryogenic electron microscopy technique. Developed by Swiss biophysicist and 2017 Nobel Laureate in Chemistry, Jacques Dubochet, this technique provided an essential scientific insight which previously would have taken up to 10 years to achieve.

Diagnostics

While established players such as Roche and Quotient took leading roles worldwide in COVID-19 testing, numerous other companies soon started to contribute with innovative solutions (see also article by Jan Lucht of scienceindustries on page 30 and the biotechnet article on page 22).

Bern based Ender Diagnostics launched a rapid molecular testing technology for COVID-19. This test delivers results within 30 minutes after the extraction of the viral RNA, with a sensitivity of 97.7% and a specificity of 100%.¹

ABIONIC in Lausanne launched the 1st COVID-19 severity score: this newly CE-marked test can quantitatively assess the severity of COVID-19 in just five minutes to enable rapid, objective patient triage.²

Swiss biotech innovation: global power and impact through diversity

To provide some context for the different diagnostic technologies and solutions being developed for COVID-19, Geneva-based FIND (Foundation for Innovative New Diagnostics) is collating an overview of SARS-CoV-2 tests that are commercially available or in development for the diagnosis of COVID-19.³

The presence of international institutions such as the WHO in Switzerland is also supporting and complementing Switzerland's significant role in this pandemic.

Drug repurposing

The world's growing knowledge of the virology and clinical presentation of COVID-19 has widened the pool of pharmacological targets. In particular, it has increased interest in drug repurposing to either inhibit SARS-CoV-2 replication or to counteract the effects of a massive cytokine release that causes acute respiratory distress syndrome (ARDS) and coagulopathy.⁴

Geneva based Relief Therapeutics has repurposed aviptadil, a vasoactive intestinal polypeptide (VIP) analog with a 20-year history of safe use in humans in multiple human trials for sarcoidosis, pulmonary fibrosis, asthma/allergy, and pulmonary hypertension. In November 2020, the drug was granted FDA Fast Track Designation, FDA emergency use IND authorization, and an expanded access protocol for the treatment of Respiratory Distress Syndrome (ARDS).⁵

Zurich based Metripharm normally focuses on drug development for chronic inflammatory diseases but is now busy with a Phase II clinical trial for MP1032, a reactive oxygen species (ROS) scavenger which the company believes is well suited to inhibiting SARS-CoV-2 virus replication.

Innovation

Molecular Partners, based in Schlieren, Zurich, develops antibody mimetic proteins in oncology (DARPin), but has swiftly added MP0420 to its portfolio. This is a custom-built protein with potential efficacy both as a prophylactic and as an acute therapy for COVID-19. MP0420 is designed to bind the receptor-binding domain of the SARS-CoV-2 spike protein at three distinct locations to prevent entry into cells.

The candidate underwent Phase I safety trials in November 2020, while future production and commercialization was being developed through an option and license agreement with Novartis AG.⁶ The ecosystem is coming together, linking innovators to global players like Novartis.

Manufacturing collaboration

In May last year, Basel based Lonza and Moderna announced their worldwide strategic collaboration to manufacture Moderna's vaccine (mRNA-1273).⁷ This has led to Lonza building three vaccine production lines in Visp (Valais), at a cost of approx. USD 200M, designed to supply 300 million doses annually.⁸

More recently, Lonza announced that it is collaborating with AstraZeneca to provide capacity for the manufacturing of AZD7442, a long-acting antibody now in Phase III⁹ for the prevention and treatment of COVID-19.¹⁰

Moving swiftly

Within months of the pandemic becoming a worldwide calamity, Lausanne based SOPHIA GENETICS launched an AI platform to sift through data generated at more than 1,000 hospitals around the world to better understand how the COVID-19 pandemic is likely to evolve.

The data mining tool uses next-generation sequencing (NGS) to see how the genome of SARS-CoV-2 changes over time, along with patients' genetic information, results of lung and CT scans, and other clinical data.

Less than six months passed between the announcement of the Lonza-Moderna vaccine agreement and the substantial manufacturing investment. Switzerland has been able to act swiftly because it could build on decades of experience, established platform technologies and a truly global network of collaborators in research, manufacturing and product development industry circles.

Working across domains

During 2020, Swiss companies continued to achieve significant milestones above and beyond COVID-19.

In October 2020, newly founded VectivBio closed USD 110M crossover financing on top of the USD 35M raised in January. The latest financing enabled the company to move forward with its Phase III program for apraglutide, a glucagon-like peptide-2 (GLP-2) analog to treat short bowel syndrome (SBS).

The mRNA field has made very significant advances in the last years, and Basel-based Versameb is likely to get a boost for its mRNA platform on the back of the Pfizer/BioNTech vaccine delivering nanoparticle encapsulated synthetic mRNA of the SAR-CoV-2 spike proteins.



Versameb has developed new ways to modulate disease translation with its VERSagile technology platform designed to produce several new molecular entities with different tissue specificity – all for one biological target.

Finally, Zurich based Neurimmune AG announced in October that the European Medicines Agency (EMA) had accepted Biogen's marketing authorization application for aducanumab mAb for the treatment of Alzheimer's disease. If approved, aducanumab would be the first treatment with the potential to meaningfully change the course of Alzheimer's disease.

Neurimmune scientists discovered aducanumab working with researchers at the University of Zurich, demonstrating how the private/public partnerships that are so prevalent in Switzerland accelerate technology transfer.

Agility, Leadership and Innovation: A long Swiss tradition

Switzerland, known for its alpine beauty, independence, stable economy and neutrality, continues to top major international rankings for innovation – see the article on Global Innovation Index 2020 by Christian Moser and Anna Maria Villa on page 19.

Continuing to ride the innovation wave also requires sacrifices and an acceptance of change. Over the centuries and with each new wave of innovation, the country has experienced creative destruction leading to reinvention and the revolutionizing of its economic fibre.

The Swiss chemicals sector of the late 1800s specialized in chemical dyes which naturally displaced earlier know-how in natural dyes. Chemical dyes prepared the ground for pharmaceuticals which were then followed by the arrival of biotechnology in the 1970s. In Hans-Peter Meyer's article (see page 26) you can read how Swiss industrial biotech innovation is now helping to drive the development of next generation of advanced therapeutics, through the introduction of biotechnology to organic chemical synthesis and production.

Biopharmaceuticals are some of the most sophisticated achievements of modern science and they thrive in Switzerland. Staying on top of innovation requires agility and leadership. As this report shows, these qualities have been invaluable in responding effectively to the COVID-19 pandemic.

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SIX-listed biotechs light up exceptional trading year



Fabian Gerber

SIX | Senior Relationship Manager Primary Markets

Embedded in one of the world's most comprehensive life sciences ecosystems, biotech companies listed on the Swiss Stock Exchange benefited from outstanding visibility among investors and the media in 2020.

Rarely before has so much been written about the sector as in the past year, and numerous companies made a name for themselves with studies, applications for approval and trial results.

Despite a challenging market environment, most biotech companies managed to further develop their product pipelines over the course of the year and in some cases were able to report considerable successes – certainly an indication of the sector's high level of agility and innovation.

Of the total announcements made by biotech companies¹ listed on SIX, 84% had a positive impact on the company's share price with an average rise of 9.6%² recorded on the day of the announcement.

Compared to 2019, trading volumes rose sharply by 177% and the total free float market capitalization of all SIX-listed biotech companies was up 30% on 2020.

Funding growth and resilience in challenging times

An IPO is more than a one-time capital raising event, and listed companies can more efficiently raise additional capital through follow-on equity capital transactions. Especially last year, the public capital markets played a very important role in ensuring companies' ongoing access to capital.

In 2020, companies listed on SIX raised a total of CHF 5.7B in fresh equity capital aimed at driving growth or strengthening capital structure. In this respect, 2020 was one of the most active years in a long time on the Swiss Stock Exchange, with several biotech companies involved.

This demonstrates the Swiss capital market's ability to satisfy the funding needs of biotech companies, even in uncertain times with high market volatility. Most notable amongst these were the transactions outlined in the following table.

COMPANY	AMOUNT	PURPOSE	DATE 2020
Idorsia	CHF 330M CHF 536M	Market launch of daridorexant and financing of further pipeline products	May 20 October 23
Molecular Partners	CHF 80M	Development MP0420 (SARS-CoV-2) and expansion of pipeline resources	July 7
Cassiopea	CHF 25M	Finance of operations and preparations for the US launch of 'clascoterone cream 1%'	June 18
Kuros Biosciences	CHF 19M	Advance and accelerate commercial rollout of MagnetOs	October 20
ObsEva	CHF 18M	Financing of further pipeline development	September 20

Source: SIX

Two months after the Idorsia share placement in May 2020, Molecular Partners successfully raised fresh capital in early July through an accelerated book building process. In the transaction, 5.53 million new shares were issued at a share price of CHF 14.50. The proceeds were used to accelerate the development of its novel antiviral SARS CoV-2 candidates ensovibep (MP0420) and MP0423, and to expand the early-stage clinical and preclinical pipeline resources.

¹ The sample group includes: Addex, Basilea, Evolva, Idorsia, Kuros Biosciences, Molecular Partners, Newron Pharma, ObsEva, Polyphor, Relief Therapeutics and Santhera
² Source: Bloomberg and Factset (average stock return on negative news: -19.6%)

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“Compared to 2019, trading volumes rose sharply by 177% and the total free float market capitalization of all SIX-listed biotech companies was up 30% on 2020.”

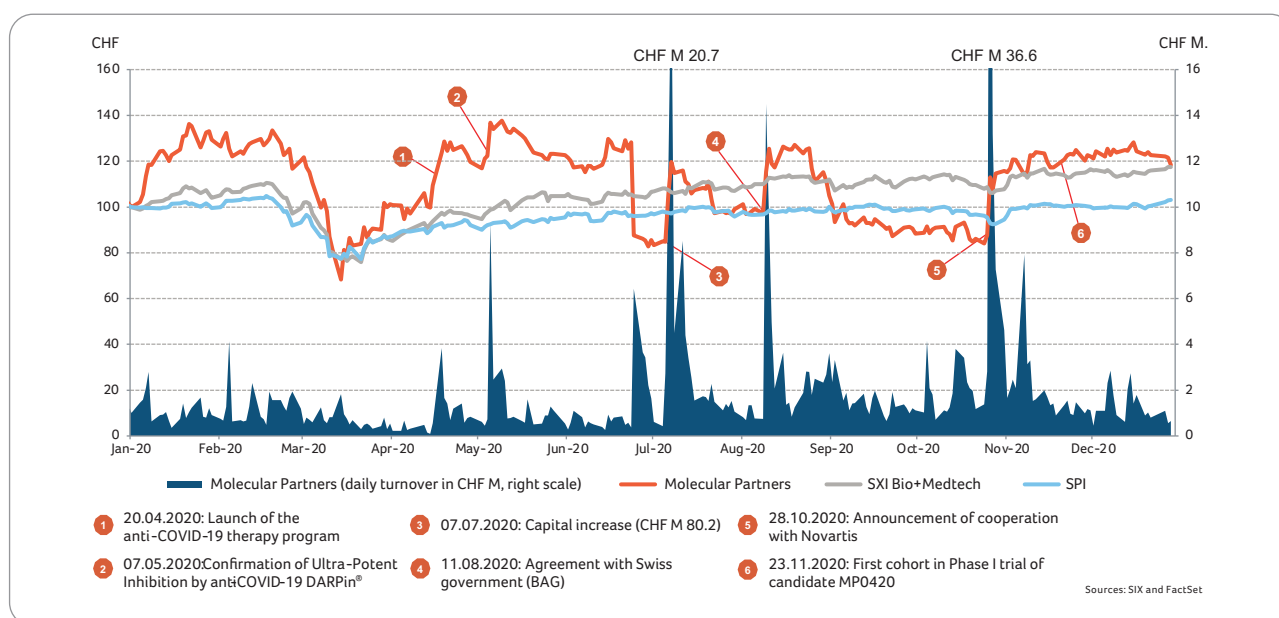
The offering included the participation of selected new and existing institutional investors in Switzerland and the European Union. However, the large majority of investors involved in this transaction came from the United States, illustrating the high visibility and attention the company achieved with its SIX primary listing among US investors.

Molecular Partners moves into the spotlight

Along with existing oncology programs, Molecular Partners unveiled in April 2020, that it had been working on developing multiple antiviral compounds against the rapidly spreading pandemic and announced the testing of its DARPin® technology to combat the coronavirus.

As early data began to emerge at the beginning of May 2020, the identified drug candidates showed very high antiviral activity in the laboratory, completely neutralizing the virus. The share price took off with high trading volumes but fell back at the end of June 2020 when the FDA rejected the application for the ophthalmic drug abicipar because in the cost/benefit assessment, the risks associated with the present formulation were weighted higher. However, investor confidence returned fast in the second half of the year as positive announcements followed in quick succession.

The increased interest in the company is reflected in both price movements and impressive trading volumes, which went up sharply in the second half of 2020 and settled at substantially higher average levels compared with previous years. This development was also driven by the strong upward swings on the days corresponding with official announcements, which can be seen in the chart below.



The chart also shows that Molecular Partners, with an annual performance of +18.3% in 2020, was able to outperform the SPI (+3.0%) and finished the year slightly better than the SXI Bio+Medtech Index³ (+17.5%), which once more clearly outperformed the SPI, highlighting the underlying attractiveness of the sector.

The increased investor interest and positive share price development enabled Molecular Partners to absorb the capital increase of early July 2020 and its free-float market capitalization increased by 72.8% year-on-year to CHF 490M by the end of 2020.

More insights on Molecular Partners' eventful year 2020 and their plans for 2021 can be found in the following [interview with the company's CEO Patrick Amstutz](#)

³ The SXI Bio+Medtech is the more narrowly defined sub-index of the SXI Life Sciences Index (Biotech, Medtech, Pharma), that consists of SIX primary listed companies from these sectors that have a minimum free float market capitalization of at least CHF 100M. The weighting of individual stocks on the index is limited at 10%.

An interview with Patrick Amstutz



Patrick Amstutz

Molecular Partners | CEO

During COVID-19 negotiations and cooperation agreements were concluded in record time. Our collaboration with Novartis for ensovibep (MPO420) and MPO423 DARPin® candidates against COVID-19 was signed in just a few weeks.

SIX's Fabian Gerber speaks to Molecular Partners' CEO Patrick Amstutz

1. How have you managed to steer the Molecular Partners team through the COVID-19 crisis and what have been the main challenges?

The COVID-19 pandemic was a challenge to our organization and our daily work processes. By overcoming these difficulties together and investing our energy to develop a potential solution for this disease, we turned the challenge into an unexpected opportunity: namely to demonstrate the value of our proprietary DARPin®-platform to fight the global pandemic.

Thanks to our strong team and our validated platform, we were able to bring the first and still only multi-specific anti-COVID drug candidate to clinic in under nine months, where antibody-based approaches are using mixtures to target more than one antigen. Our researchers took on extra shifts as the COVID-19 activities came on top of our existing R&D pipeline.

To secure effective operations, we decided to maintain the majority of our research and development teams on-site, while G&A staff were encouraged to work from home as much as possible. This freed up office space for the R&D team, so that they had sufficient room for the required distancing.

2. Was the CRL (Complete Response Letter) received for abicipar for wet-AMD in June a surprise for your organization?

Not sure if surprise is the right word. We expected an approval. Disappointment is a more accurate word. The agency took the position that the risk/benefit profile was not sufficient for an approval at this time. This relates to the inflammation rates seen in the Phase III trials, both of which yielded positive efficacy results.

“Our specialist investors clearly believe in the potential and power of our COVID-19 therapeutic program and consider it to be in the sweet spot to perfectly complement vaccines.”

Given the “less-frequent” dosing profile demonstrated by abicipar and the endpoints met in the Phase III trials, we believe there is still value in exploring the potential path to approval of the program. As we don't own the program, we are in an ongoing dialogue with our partner Abbvie on how to maximize the value of abicipar.

3. How did you then ensure that your company still had a bright future?

As a reminder, abicipar, while it is our most ‘senior’ asset, has been partnered for almost 10 years now. Our pipeline and our discovery have moved into oncology and now virology. So, we have been building our future for many years, ensuring that not just one program would decide our fate.

Some of the most difficult moments in the life of a biotech company are associated with a live-or-die decision for its lead program. We enjoy the benefit of a broad discovery engine where multiple candidates have been, and continue to be, generated for the benefit of patients.

The capital increase which we were able to execute just one week after the CRL - at basically zero discount - also underlined that there were many specialist investors who prefer to invest in our earlier pipeline over abicipar. They strongly believe in the value creation, combining top science with the differentiating DARPin® platform to create a portfolio of candidates.

4. Why were investors, who fully absorbed the capital increase in July, so keen to be part of the Molecular Partners story and where did you and they see the opportunities?

These investors were clearly aligned with the potential of the company pipeline and discovery engine, and understood that the abicipar setback had no cross talk to the other programs. They recognized that there was so much more to value in Molecular Partners, as we are discussing here today.

The new specialist investors clearly believed – and continue to do so - in the potential and power of our COVID-19 therapeutic program with ensovibep (MP0420) and MP0423, and consider our therapeutics in the sweet spot to perfectly complement vaccines.

Moreover, they see the scientific value of our programs in oncology, which allow for a tumor-localized activation of the patient's immune system, limiting side effects and hence ultimately expanding the therapeutic window.

Both programs are great examples of our 'DARPin® difference', the unique properties illustrating the strength of our platform and the underlying DARPin® molecules. This platform makes it possible for us to continuously open new opportunities for Molecular Partners and hence for our shareholders.

5. Where do your priorities for 2021 lie and what are the milestones or value inflections which excite you most?

Our priorities focus on driving our clinical assets forward, the continued expansion of our therapeutics platforms and broadening our newly established virology program.

The 2021 milestones are as follows:

1. Proof of Concept and a potential Emergency Use Application for our COVID-19 therapeutic ensovibep (MP0420)
2. Setting the dosing scheme with our lead I/O (immuno-oncology) asset, AMG 506 / MP0310, and the potential move of the program into the next clinical trial stages, together with our partner Amgen.
3. Advancing MP0317, our second I/O asset into clinical studies
4. Selecting the next development candidate for the pipeline

Another key priority for myself and my colleagues on the company's leadership team remains of course to continue to steer the entire Molecular Partners family safe and sound through the remainder of this crisis.

6. What do you think the lasting impact of COVID-19 will be on the sector?

The industry has rediscovered the term 'co-opetition'. Competition has become cooperation in specific areas. The new consortia such as ACTIV in the USA or Agile in the UK with their standardized protocols and a pool of recruited patients are emblematic of this. This is a quantum leap for our sector.

Negotiations and cooperation agreements were also concluded substantially faster than in the past. We can confirm this with our important collaboration with Novartis for ensovibep (MP0420) and MP0423, which we signed in just a few weeks. The same can be said for collaborations with external partners such as universities and other research institutions and laboratories - in our case the Spiez laboratory and the universities of Utrecht or Berlin.

In R&D, the industry has been working extremely efficiently under pressure in many cases 24/7. What is normally done in sequence, now runs in parallel. This means higher speed, but also much higher financial risk. In addition, new technologies of know-how management and transfer enable very productive processes. For certain parts of our value chain, this approach should be a blueprint for the future.



S-GE speaks to Merck Switzerland



Sirpa Tsimal

Switzerland Global Enterprise | Director Investment Promotion

Foreign biotech investors in Switzerland: Find out why Merck regard Switzerland as a strong, strategic, and ever more attractive location for biotech.

Why Switzerland is a Key Part of Merck's Success Story

Science and technology leader Merck has been in Switzerland for almost a century. Today it has eight sites, including five manufacturing facilities, and in the last two years the company has invested a further EURO 418M in new production capacity.

How did Merck come to have eight sites in Switzerland and what is the current focus of activities?

We have been here since 1929 and the number of sites reflects our growing business, especially in healthcare and life sciences.

To date we have five manufacturing facilities producing high quality, specialist products for a global market. Merck sites in Aubonne and Corsier-sur-Vevey are the primary hubs for the manufacture of biotech medicines, and play an important role in the growth of our healthcare business and the launch of new medicines worldwide. Switzerland is also the home to the Merck Global Health Institute and the Connected Health & Devices organization, both based in Eysins.

Our healthcare business in Zug is dedicated to serving the needs of the Swiss market, while our sites in Buchs, Schaffhausen and Altdorf form a key hub for the development and manufacturing of analytical standards, certified reference materials and critical pharma raw materials. They are also home to our customer-specific pharma intermediates, active pharmaceutical ingredients and drug delivery compounds.

Are there any further plans for expansion?

Over the past two years, we have made significant investments in Switzerland. In March 2019, we announced a EURO 150M expansion of our biotech manufacturing site in Aubonne. We followed this with a EURO 250M investment in a new biotech development center in Corsier-sur-Vevey in January 2020.



Christiane von der Eltz,

Merck Switzerland AG |
General Manager and Managing Director

And in July 2020, we announced a EURO 18M investment for a new laboratory facility in Buchs to support our rapidly growing reference materials business.

Alongside these transformational investments, we continue to invest in our Swiss manufacturing sites – as we do around the world – to maintain state-of-the-art industry levels.

In what capacity are Merck's Swiss units working on the company's new manufacturing approach for the production of life-saving biologics?

The Merck Biotech Development Center, currently under construction in Corsier-sur-Vevey, will be Merck's global center of expertise for biotech development and manufacturing for clinical studies. The aim is achieve sustainably secure capacity and high agility to deliver clinical trial material in a cost-effective way. The new center will help to accelerate development timelines for new biological entities and address the ever increasing manufacturing complexity involved in the production of next-generation biotech compounds.

The new facility will be equipped with the most advanced digital solutions and operate to the highest technological standards, including continuous manufacturing and laboratory automation. It will offer a flexible-by-design infrastructure to readily adapt to emerging needs and technology evolution, as well as open and inspiring workspaces to enable collaboration, creativity and innovation.

This investment is closely allied to the growth and progression of Merck's healthcare pipeline and its future potential. It reflects Merck's commitment to speed up the availability of new medicines for patients in need.

Emerging technologies such as artificial intelligence and block chain play an important part when it comes to innovating in the healthcare space. What are some of Merck's current projects in this field?

In healthcare, digitization is an opportunity to improve the way in which we serve our patients. This is true across the whole value chain, from research & development through to manufacturing, supply and commercialization.

In biotech manufacturing, we are using data science to improve the process development of our biotech medicines. For example, machine learning techniques can be used to optimize selection of the most efficient cell clones for manufacturing activities.

Another example is the use of real-time multivariate analysis in biotech manufacturing. Its application to production in bioreactors demonstrates how big data and machine learning can deliver significant improvements in productivity and quality.

What are major challenges and opportunities that Merck foresees in the healthcare space in general and the biotech industry in particular, and how does it aim to tackle them?

Ensuring the flawless supply of current medicines and speeding up the availability of new medicines for patients in need are two key challenges in the healthcare space. In fact, these are the drivers for our two major ongoing investments in the Lake Geneva area: the expansion of our biotech manufacturing site in Aubonne and the construction of a new biotech development center in Corsier-sur-Vevey.

How would you characterize Switzerland as a biotech location?

Switzerland offers attractive and stable conditions for international companies and is one of the best and most innovative locations for biotechnology in Europe. It occupies a unique political and commercial position that can be advantageous for biotech companies, whilst ensuring strong connections to the global markets. Modern infrastructure, high quality of life, and access to highly trained employees contribute to the extremely positive conditions for a strong and future-oriented biotechnology industry in Switzerland. And importantly, we can be confident that these conditions will be maintained over the longer term.

How would you describe in four words, what Switzerland means as a location to Merck?

Strong, growing, strategic and innovative.



**Merck biotech
development center
in Corsier-sur-Vevey
EURO 250M investment**

S-GE speaks to CSL Behring

Investing in Switzerland: Find out how CSL Behring is keeping the promise with lifesaving innovation

For over a century, CSL Behring (CSLB) has kept its founding promise to help patients suffering from rare and serious diseases. It specializes in the manufacture of medications for treating immune deficiencies and disorders of the immune function, as well as medications for rhesus prophylaxis and albumin solutions for shock and burn victims. Martin Schären, Senior VP and General Manager of CSL Behring AG in Bern, explains how the company continues to innovate and deliver life-saving medicines.



CSL Behring
Biotherapies for Life®

Martin Schären

CSL Behring AG, Bern |
Senior VP and General Manager

From your portfolio of projects in development, what are the most exciting assets on which you're currently working?

Our strong Research & Development (R&D) pipeline utilizes our expertise in plasma fractionation, recombinant technology, and cell and gene therapy to develop and deliver new and improved products. These address unmet medical needs or enhance current treatments in five therapeutic areas: immunology, hematology, cardiovascular and metabolic, respiratory, and transplant. In each of these therapeutic areas, we have many exciting and very promising assets in our R&D portfolio.

Examples include:

CoVlg-19 hyperimmune

The Phase III study, in which the CoVlg-19 Plasma Alliance is participating, enrolled its first clinical trial participant in early-October 2020. The study will take several months to complete but, if successful, will form the basis for regulatory submissions. The CoVlg-19 hyperimmune medicine has the potential to treat individuals with serious complications from COVID-19.

CSL112 for early recurrent cardiovascular disease (CVD) events following acute myocardial infarction (MI)

We are advancing a Phase III study for potential treatment of acute coronary syndrome. The trial is evaluating the efficacy and safety of CSL112 during the high-risk 90-day period following a heart attack.

Lentivirus-based gene therapy of hematopoietic stem-cells

We are advancing the lentivirus-based gene therapy technology acquired a few years ago from Calimune. A first product for the treatment of sickle cell disease (SCD) is currently in Phase I.

The same technology is used in a second product to treat primary immune deficiency (Wiskott-Aldrich-Syndrome) and entered development a few months ago.

What efforts has CSL Behring made to address the rare disease community's concerns around the pandemic?

Thanks to our strategic partnerships and collaborations with academia, industry, and governments, we were able to respond rapidly to the public health crisis. In addition to our usual programs which provide help and support for patients and their families, throughout the pandemic we have increased our online programs and media presence and have introduced a number of activities and initiatives across our affiliates. These are directed at specific patient groups or highlight the value of plasma and its relevance to the rare disease community in the current crisis.

CSLB has many ongoing projects to combat the novel coronavirus:

1. We co-founded the CoVlg-19 Plasma Alliance together with Takeda, who also run a manufacturing site in Switzerland, in Neuchatel, an unprecedented industry partnership of more than 10 plasma industry companies, to develop a hyperimmune for treating COVID-19.
2. An agreement with AstraZeneca means that CSLB will manufacture the Oxford University vaccine candidate for distribution in Australia. The vaccine is manufactured at our facilities in Melbourne, Australia, and first doses are scheduled for release in early 2021.
3. CSLB is developing an investigational, anti-SARS-CoV-2 plasma hyperimmune product for the Australian market. This will be used to treat people with serious complications from COVID-19. Manufacturing for the clinical trial has already started.

CSL Behring has a new CHF 300M, state-of-the-art immunoglobulin manufacturing plant (project Protinus) in the Swiss canton of Bern. How was the site chosen, and what is your experience in Switzerland?

Decisions on the location of capital investments are based on a site selection process that sits within the company's network strategy. Key considerations include critical mass, existing technical expertise and capability, infrastructure, access to a supplier's network, regulatory risk, ongoing government and industrial relations, financial stability, and possible synergies.

When it came to project Protinus, the deciding factors were time to market and the proven track record of the Bern site. Proven track record relates to those typical Swiss virtues; namely reliability, precision and quality work. Our experience in Switzerland is that it usually requires less effort to meet deadlines and to achieve objectives on time and within budget.

You have R&D and regional headquarters in Switzerland. What role does Switzerland play in your global strategic corporate footprint?

Switzerland plays an important role for our global business. At the Bern site we are the Center of Excellence for immunoglobulins (Ig). The therapeutics we manufacture are key drivers in the success and solid growth of the company. The demand for our Ig-therapies and portfolio remains strong and they continue to perform well.

R&D fuels the company's sustainable growth by advancing world-class science, technology, and collaboration. At sitem-insel AG, where we have our R&D hub next to the Insel Hospital in Bern, we are very pleased to have scientific experts so close to our manufacturing site. Our team of around 70 researchers fosters the important dialogue between industry and academic research, and promotes technology transfer and operational cooperation, as well as our network of strategic alliances.

Reinforcing our focus on R&D in Switzerland, we have entered a partnership with BaseLaunch. This is an accelerator and incubator for early-stage ventures developing cutting-edge therapeutics, headquartered in Basel. The partnership will help us to identify and build relationships with potential external collaborators throughout Europe, which in turn will strengthen our position in Switzerland. Equally, our Research External Innovation (REI) team has entered a collaboration with Biopôle in Lausanne to offer additional R&D and technology development opportunities.



What are the challenges and trends in biologics production and what innovations have you achieved in your manufacturing processes?

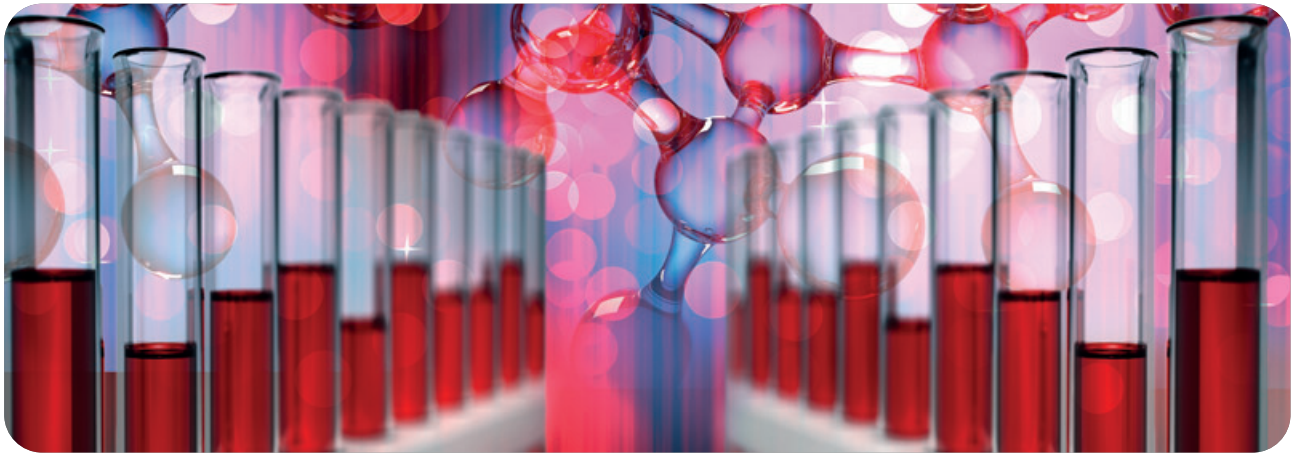
Our main challenge is to continuously optimize our manufacturing processes and improve process recoveries at our already high performing facilities. Efficient and effective supply chain management is also crucial to our success, and we need to build flexible organizations that are agile and able to react promptly to customers' and/or stakeholders' needs.

At CSLB, we have reacted to these challenges and believe that we are well placed to respond to future trends. Just recently, we established an End-to-End (E2E) Operations organization across the company, along with a strategic review of E2E supply chain. We also implemented a new enterprise resource planning (ERP) across our global network.

We are a purpose-driven company with a values-based culture. All of our 27,000 employees are working to implement our longstanding promise to deliver the latest technologies that save lives and protect the health of people around the world.

Innovation is one of our five global core values and a pillar in our global strategy - but perhaps most important is the continuous investment in our people.

About the Swiss Biotech Success Stories



Swiss Biotech Success Stories demonstrate the power and potential of Swiss biotech

The Swiss Biotech Success Stories Awards recognize valuable accomplishments and honor those who have made important and sustainable contributions to the biotech industry in Switzerland. The awards are presented each year at the Swiss Biotech Day and reflect the diversity and achievements of this innovative industry.

Switzerland is one of the world's leading biotech hubs and attracts many foreign companies, specialists and investors. It provides over 50,000 jobs and, together with the pharmaceutical industry, accounts for over 40% of Swiss exports.

To make the industry's impact more visible, the Swiss Biotech Success Stories initiative was launched in 2018. Selected success stories are showcased to illustrate how Swiss biotech companies help patients, improve health care worldwide, and make a valuable and significant contribution to the Swiss and global economy.

Laureates are individuals or groups who have earned extraordinary merits. Success is broadly defined as scientific, translational, medical or commercial, together with other aspects that have a positive impact on the biotech and life science industry and society in Switzerland.



“It is essential to share with the public the importance and success factors of biotech companies and to ensure that decision makers understand what it takes for the industry to develop and remain competitive.”

says Michael Altorfer, CEO of the Swiss Biotech Association.

“At the same time, young talent should be inspired and motivated to take a closer look at the great variety of career profiles in biotech. As a successful and booming economic sector, the biotech industry depends on many passionate, visionary and well-trained up-and-coming talent.”

An independent jury of experts



Luca Bolliger
President of the jury
 Vice President Swiss Biotech Association



Patrick Aebischer
 President Emeritus EPFL
 Serial Entrepreneur



Stefanie Flückiger-Mangual
 CEO and Co-Founder
 Tolremo



Gabrielle Gache
 President Swiss Healthcare
 Licensing Group
 Chief Business Development
 and Market Access Officer,
 OM Pharma



Ulrich Geilinger
 Co-Founder and Senior
 Partner, HBM Partners



Seraina Gross
 Journalist Handelszeitung



Daniela Marino
 CEO and Co-Founder
 Cutiss



Jürg Zürcher
 Partner, Biotechnology Leader
 GSA, EY



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Thomas Staffelbach
Secretary of the jury
 TS Kommunikation

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The Swiss Biotech Success Stories Awards are also supported by



Basel-Stadt

INNOTIO

Award winners 2019



Headquartered in Zug, Biogen has been a key stimulus and model for the biotech industry. Its best-selling drug against multiple sclerosis or its latest Alzheimer's candidate, as well as the new production facilities in Luterbach, creating 600 new jobs, are proof of Biogen's success.



The Schlieren-based company has been an integral part of Roche Pharmaceutical Research and Early Development since 2005 and is a pioneer in antibody engineering in cancer immunotherapy. Its antibody glycosylation technology increases immune-mediated killing of cancer cells and builds the basis for improved cancer medicines.



Fully integrated into GlaxoSmithKline since 2013, Okairos from Basel developed innovative T-cell based vaccines for major infectious diseases such as malaria, hepatitis C, HIV, and Ebola. Its novel replication-incompetent adenovirus vectors could enable the development of important new vaccines and offer immunizations against illnesses that lack vaccines.



The advanced technologies in protein expression by Selexis provide biotech and pharmaceutical companies with a rapid, stable, and cost-effective solution for the production of recombinant proteins. Nearly a hundred drug candidates in clinical development and three commercial products utilize the technologies of the Plan-les-Ouates-based company.



This transformational joint venture provides Vifor Pharma direct access to dialysis patients, facilitating the product distribution and recruitment for clinical development. It transformed the company from Glattbrugg rapidly into a global nephrology corporation. Such vertical integration is a role model for the convergence of different life science sectors.

Award winners 2020



Headquartered in Allschwil, Actelion is part of the Johnson & Johnson Family of Companies. Its ground-breaking research and medicines have been a key contributor to improve the lives of people affected by pulmonary hypertension, and have made Actelion an industry leader in this area.



Family-owned Debiopharm from Lausanne, identifies high-potential compounds in oncology and for the treatment of bacterial infections. They are tested in clinical development and licensed to business partners globally. Over a million patients benefit from their therapies every year.



Helsinn, an important employer in Ticino, has a broad portfolio of marketed cancer care products and a deep development pipeline. It has built significant R&D and manufacturing capacities, and also advances patient care and supports healthcare innovation with its investment fund.



The trio of foundations has been supporting biotech startups with great success for more than 10 years, thereby making a significant contribution to the growth of the Swiss biotech industry. They share the nomination for the Swiss Biotech Success Stories Award.



The Swiss microbiologist and geneticist won the 1978 Nobel Prize in Physiology or Medicine for his discovery of restriction endonucleases. His groundbreaking research in the field of molecular genetics was instrumental in the development of biotechnology.

Find more info at swissbiotech.org/success-stories

Swiss Biotech Success Stories award winner 2021

Bachem



BACHEM
PIONEERING PARTNER FOR PEPTIDES

Bachem is a leading manufacturer of peptides and oligonucleotides. The company has grown over 50% in the last five years and now offers more than 5,500 different biologically active peptides amino acid derivatives and oligonucleotides. Its investment plans call for the investment of over USD 400M to continue to pursue its growth strategy.

Bachem is a leading, innovation-driven company in the development and manufacture of peptides and oligonucleotides.

With 50 years of expertise, Bachem provides products for research, clinical development and commercial application to pharmaceutical and biotechnology companies worldwide, and offers a comprehensive range of services.

Founded in 1971 as Bachem Feinchemikalien AG in Liestal, near Basel, the company's initial focus was on amino acid and peptide synthesis. From this original business idea, Bachem grew to the world's leading company in the development and production of peptides and oligonucleotides: a success story based on courage, innovation, quality, partnership and exceptional people. The company is strongly committed to sustainability, and takes a responsible attitude towards its employees, society, and the environment.

Long-term growth has always been a key measurement of success at Bachem, as was made clear when founder and Honorary Chairman, Dr. h.c. Peter Grogg took the company public on the Swiss Stock Exchange in 1998. Today, Bachem is supporting pharma and biotech companies in ~ 150 NCE peptide projects in different clinical development phases. It has expanded its portfolio by establishing itself as a full-service

provider for the development of oligonucleotides. The company also innovates and excels in the development and manufacture of peptides and complex organic molecules, offering more than 5,500 different biologically active peptides, amino acid derivatives, and biochemicals in its stock catalog.

With headquarters in Switzerland and operations in Europe, the US and Asia, Bachem has a global reach. A research and development facility was recently opened in Bubendorf, and over the past five years Bachem AG has grown by more than 50% - it now employs over 1,000 people across its sites at Bubendorf & Vionnaz in Switzerland. In 2018, a sales office was opened in Tokyo, Japan, to drive business in the Asian market and strengthen customer support. With investment plans for over USD 400M in the next five years, the Bachem Group will continue to pursue its ambitious growth strategy.

Swiss Biotech Success Stories award winner 2021

Basilea



Basilea Pharmaceutica is a leader in targeted oncology small molecules, novel antibiotics and antifungals. Since its listing in 2004 (SIX: BSLN), Basilea has launched two anti-infective treatments: Cresemba (isavuconazole) for invasive fungal infections and Zevtera (ceftobiprole), an antibiotic for severe hospital bacterial infections.

Basilea Pharmaceutica is a commercial stage biopharmaceutical company based in Basel. The company is focused on the development of products that address the medical challenges in the therapeutic areas of oncology and infectious diseases.

Led by CEO David Veitch, Basilea is one of only a very few biopharmaceuticals in the world that is actively combining the research, development and commercialization of targeted oncology small molecules, as well as of new antibiotics and antifungals.

Since its listing in 2004 (SIX: BSLN), Basilea has successfully brought three brands to market. Two of these are anti-infective treatments: Cresemba (isavuconazole) is for invasive fungal infections and Zevtera is an antibiotic for severe hospital bacterial infections.

The company also has two clinical stage oncology assets in development and a number of pre-clinical assets in research - covering both oncology and infectious diseases.

Basilea's growing portfolio results from a combination of internal research and development and in-licensing compounds from outside the company. Over 100 countries are covered by commercial partnerships and in-market sales by partners for its anti-infective brand, Cresemba, were more than USD 250M in 2020 alone.

The experienced team at Basilea has proven expertise in transitioning compounds from research through development to the market and the company currently commercializes its brands in over 50 countries. It is this ability to establish and manage successful partnerships in research, development and commercial phases that has helped to set it apart from other biotech companies in a highly competitive marketplace.

Swiss Biotech Success Stories award winner 2021

ESBATEch



ESBATEch, now a Novartis company, is recognized for its pioneering role in developing single-chain antibody fragments for ophthalmic indications. The most advanced product from the ESBATEch platform received marked approval by the FDA in October 2019 and shortly thereafter in all major markets.

The product Beovu (brolucizumab) is approved for the blinding eye disease wet age-related macular degeneration, and could help thousands of patients to preserve their vision. Beovu is the first single-chain antibody fragment coming to market.

Founded in 1998, the company was for 18 years led by co-founder and CEO, Dominik Escher. During that time, ESBATEch raised an impressive USD 90M in venture capital through Series A & B funding rounds. The USD 50M raised in the Series B round of 2006 was one of the largest financing rounds at that time for a preclinical stage biotech company.

ESBATEch's pioneering of a novel technology to identify highly stable and soluble single-chain antibodies was a game changer after the many failures to develop conventional single-chain antibody fragments by other companies.

Those failures in preclinical or clinical development were mainly due to stability, aggregation and manufacturing issues. Bearing in mind that single-chain antibodies were first described in 1988, this makes ESBATEch's breakthrough all the more impressive and critically important.

Some 11 years after its founding, ESBATEch sold its ophthalmic business for USD 589M to Alcon, the leader in eye care. Shortly thereafter, Alcon was acquired by Novartis. The rise to prominence and success of ESBATEch's sale to Alcon can be attributed to the determined innovation and lasting impact of the company's entire team under Dominik Escher.

Swiss Biotech Success Stories award winner 2021

Lonza



Lonza

Pharma & Biotech

Lonza is a global leader in contract development and manufacturing services with strong R&D capabilities and world-class facilities across five continents. In 2020, Lonza supported more than 820 pre-clinical and clinical small and large molecules, more than 245 commercial small and large molecules and produced 230 billion capsules.

Founded in 1897 in Gampel, Switzerland, Lonza is a preferred global partner to the pharma, biotech and nutrition industries. With approximately 14,000 full-time employees, the company is led by Pierre-Alain Ruffieux, CEO, and Albert Baehny, Chairman of the Board of Directors of Lonza Group Ltd.

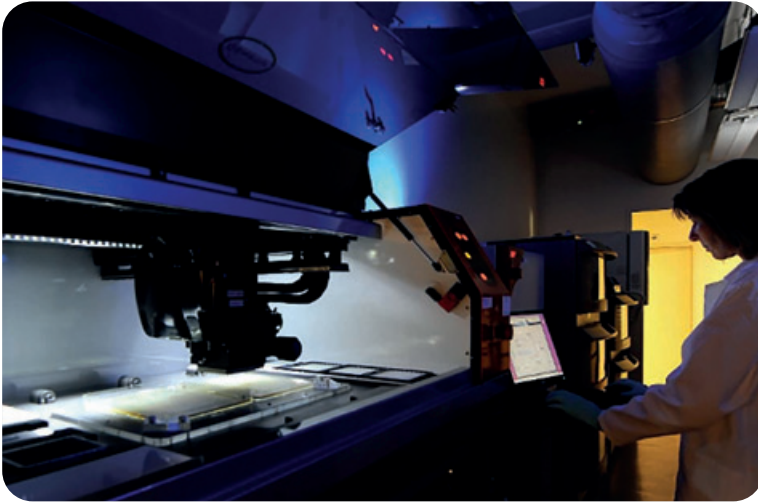
Lonza works to prevent illness and enable a healthier world by supporting its customers to deliver new and innovative medicines that help treat a wide range of diseases. Lonza's broad capabilities span across biologics, small molecules, bioconjugates, mRNA, and cell and gene technologies. The company manages projects from research, discovery and pre-clinical stages, through to commercialization, from established therapeutics to advanced personalized medicines. Its expertise covers both drug substance and drug product.

Lonza's contract development and manufacturing services portfolio is recognized for its high-quality services, regulatory track record, strong R&D capabilities, global footprint, innovative technology platforms and extensive experience. In 2020, Lonza supported more than 820 preclinical and clinical small and large molecules, more than 245 commercial small and large molecules and produced 230 billion capsules.



Swiss Biotech Success Stories award winner 2021

Novimmune



novimmune 


LIGHTCHAIN
BIOSCIENCE

Founded by the renowned immunologist, Professor Bernard Mach MD PhD, privately-owned Novimmune is a leading light in the discovery and development of fully-human, antibody-based drugs used to fight autoimmune and inflammatory diseases and cancer.

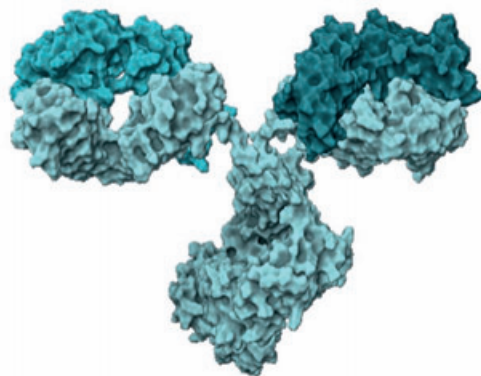
Novimmune is known for its development of a proprietary next-generation platform for the creation of monoclonal and bi-specific antibodies. This innovative approach to discovery and development has led to the creation of sixteen mono- and bi-specific human antibodies since the company was established in 1998.

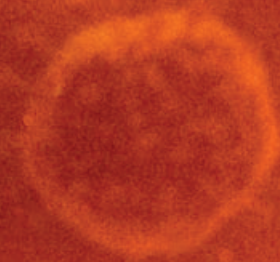
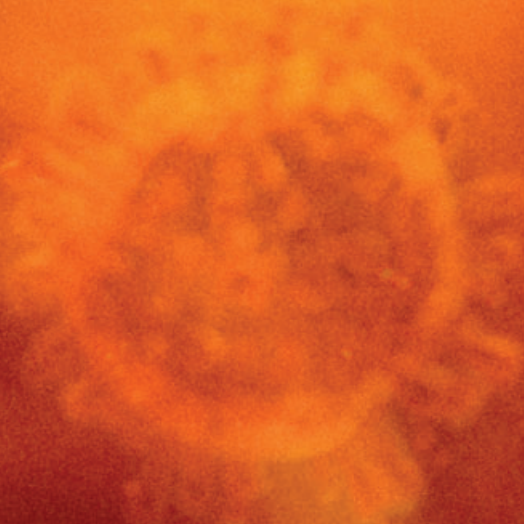
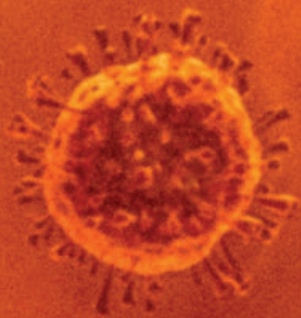
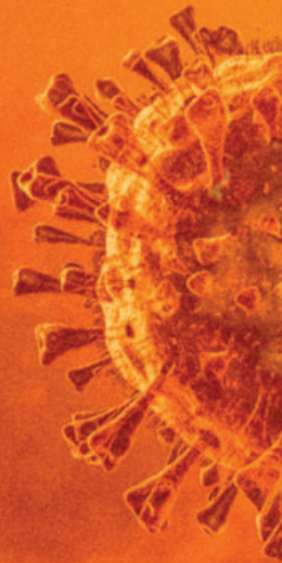
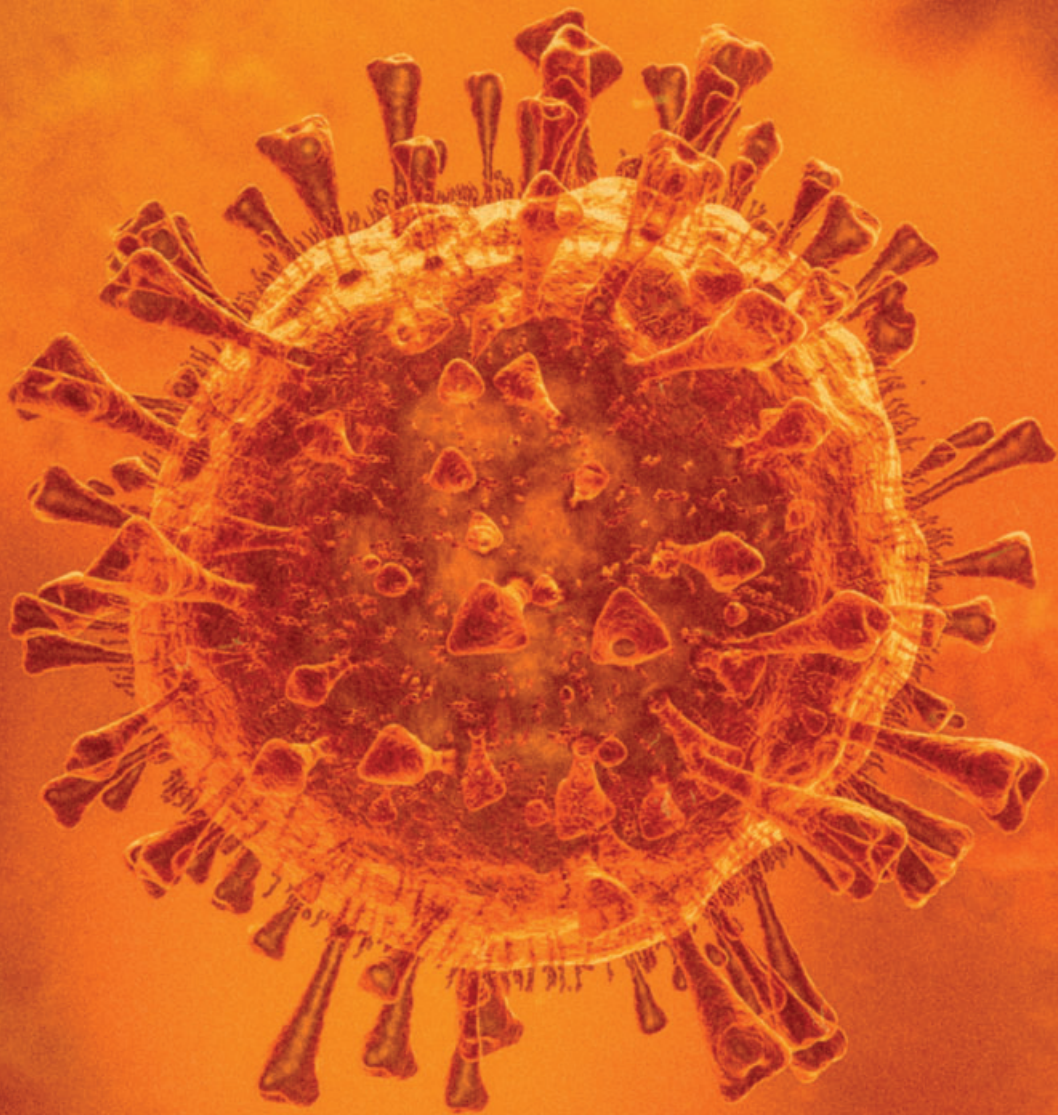
To date, Novimmune has brought six monoclonal antibodies, as well as a first bispecific antibody based on its proprietary format, to clinical development stage. Notable amongst these is the anti-IFN γ monoclonal antibody, emapalumab, developed as a treatment for primary Haemophagocytic Lymphohistiocytosis (HLH), which was approved by the Food and Drug Administration for the use in this indication and still in development for secondary HLH.

Prior to the development of emapalumab, no drug had ever been studied for the treatment of this disease nor had any drug been approved by regulatory authorities. In 2019, Novimmune successfully divested emapalumab, the anti-IFN γ monoclonal antibody, Gamifant[®], and related assets to SOBI.

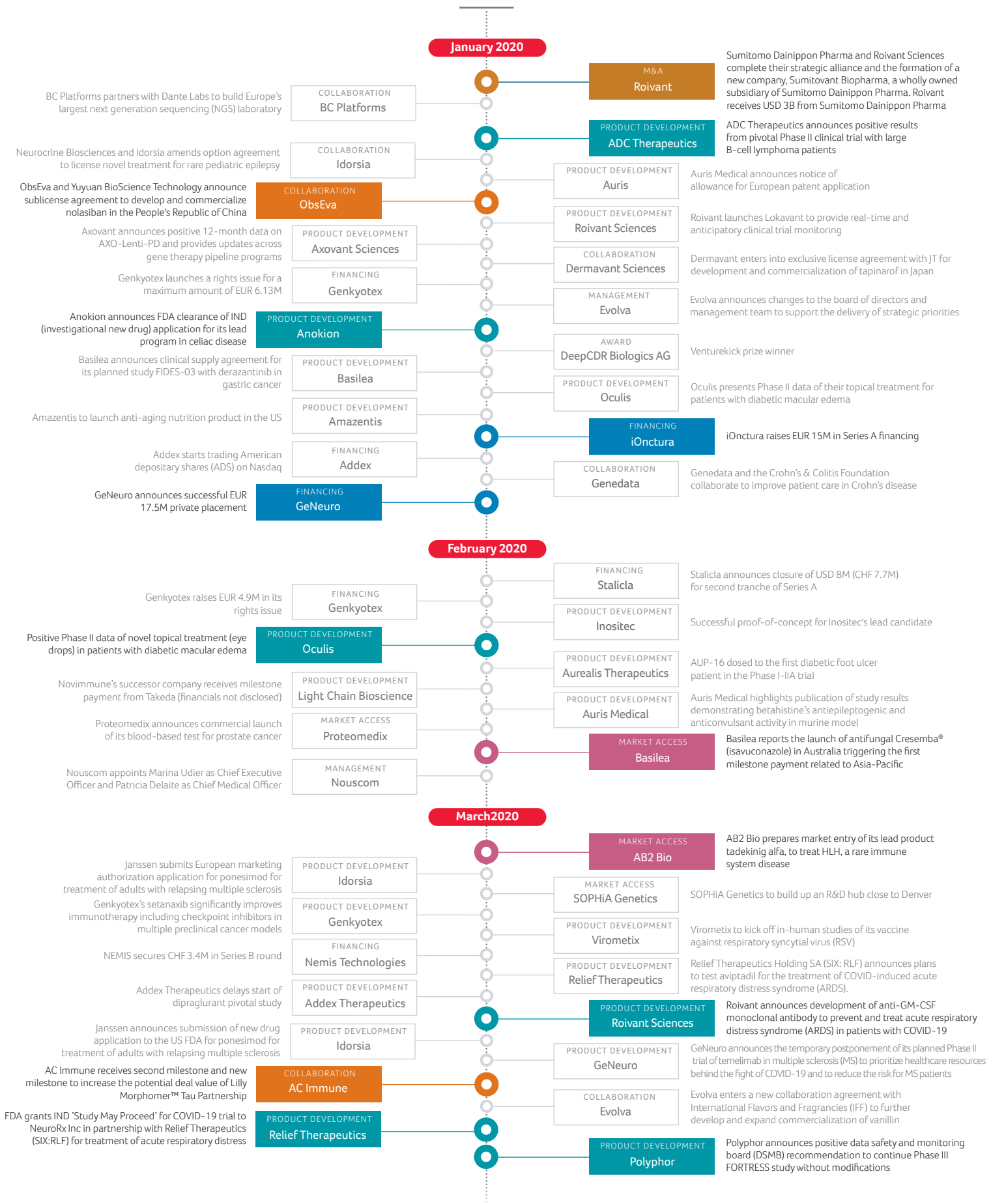
Novimmune recently moved to state-of-the-art facilities located in Geneva and operates under the brand “Light Chain Bioscience” to develop its bi- and multi-specific antibody technologies and associated programs, focusing on immuno-oncology and other indications.

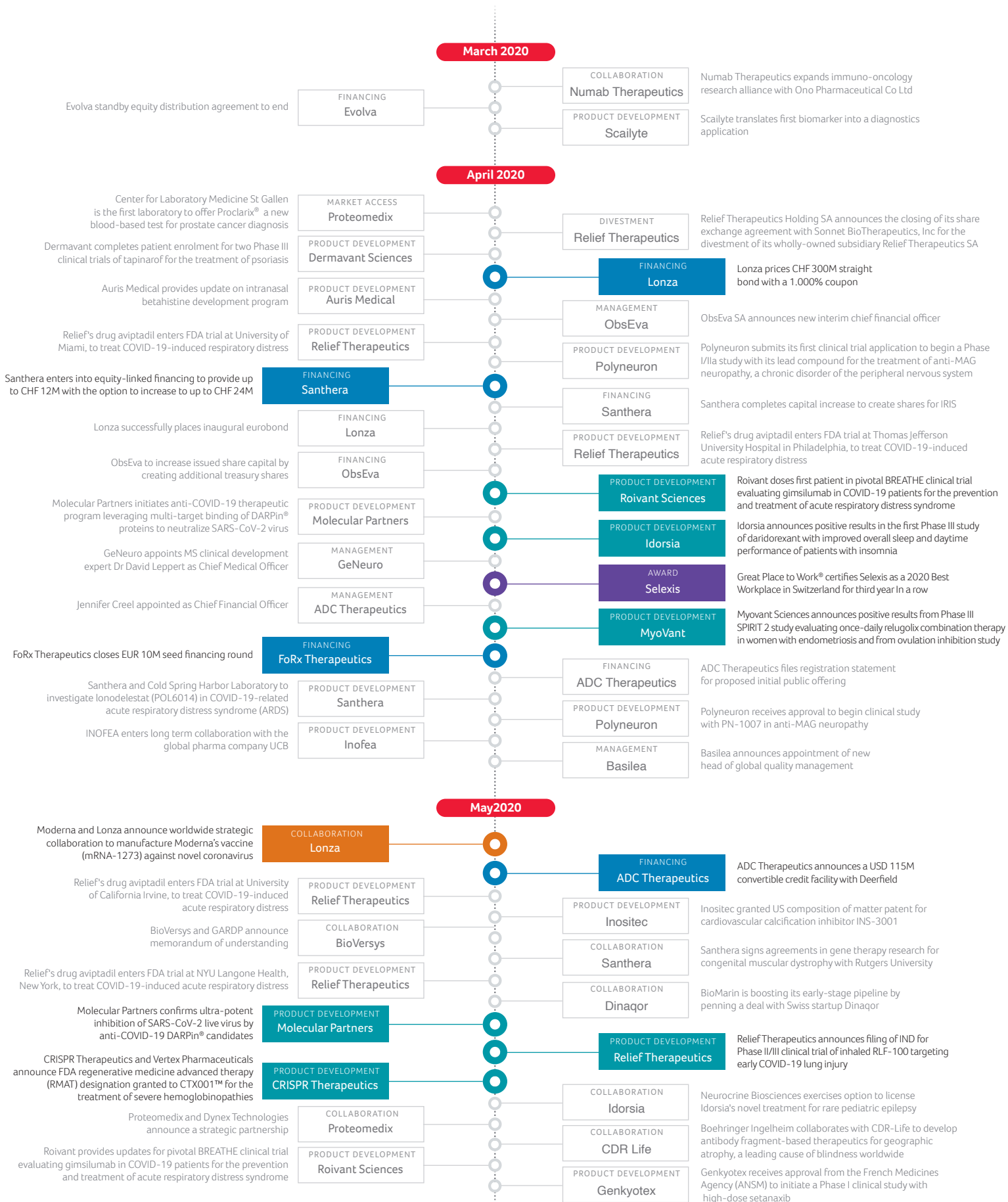
Today it employs around 60 people spanning 7 different nationalities. The team is highly skilled in discovery, preclinical research, and manufacturing and clinical research.



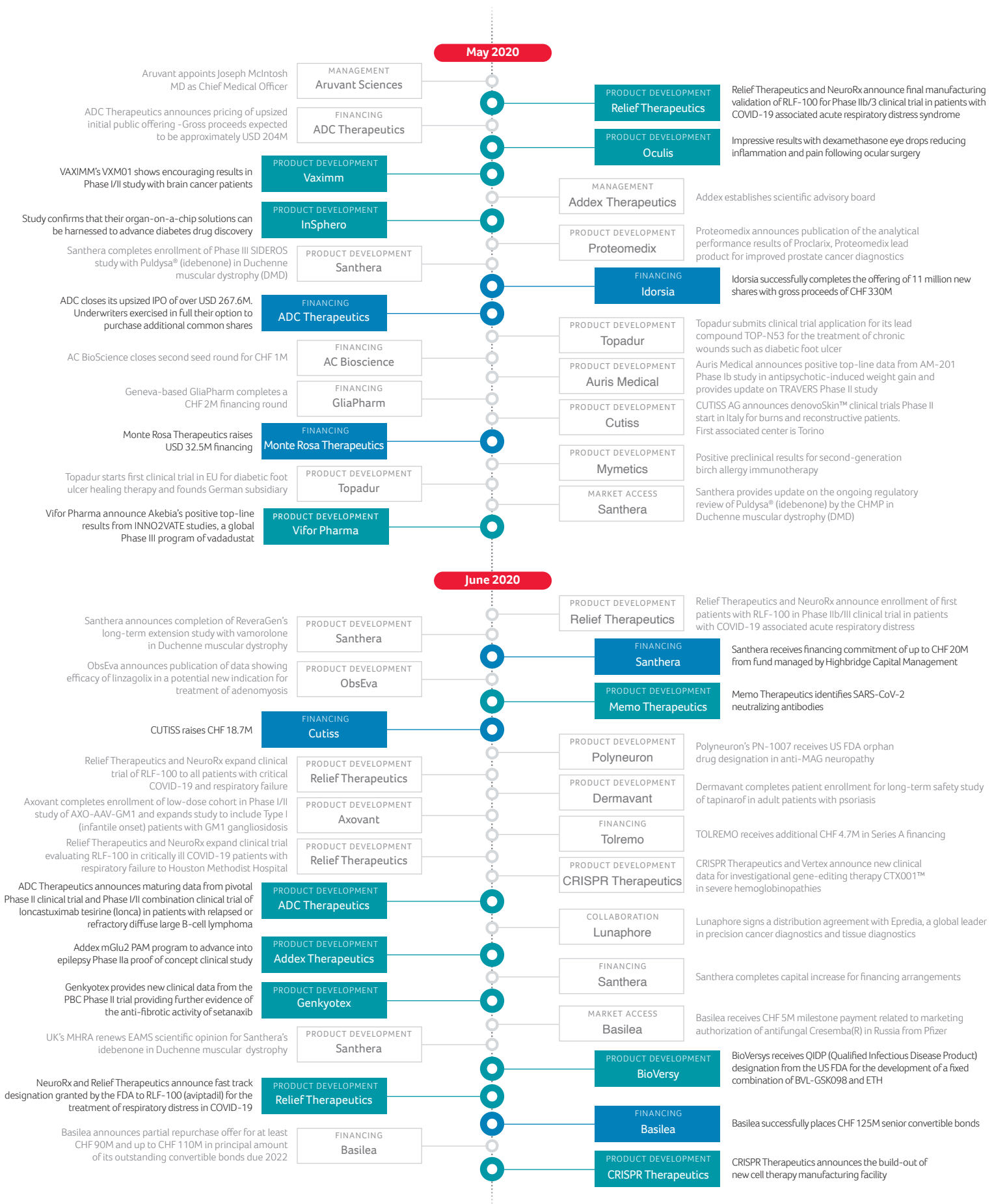


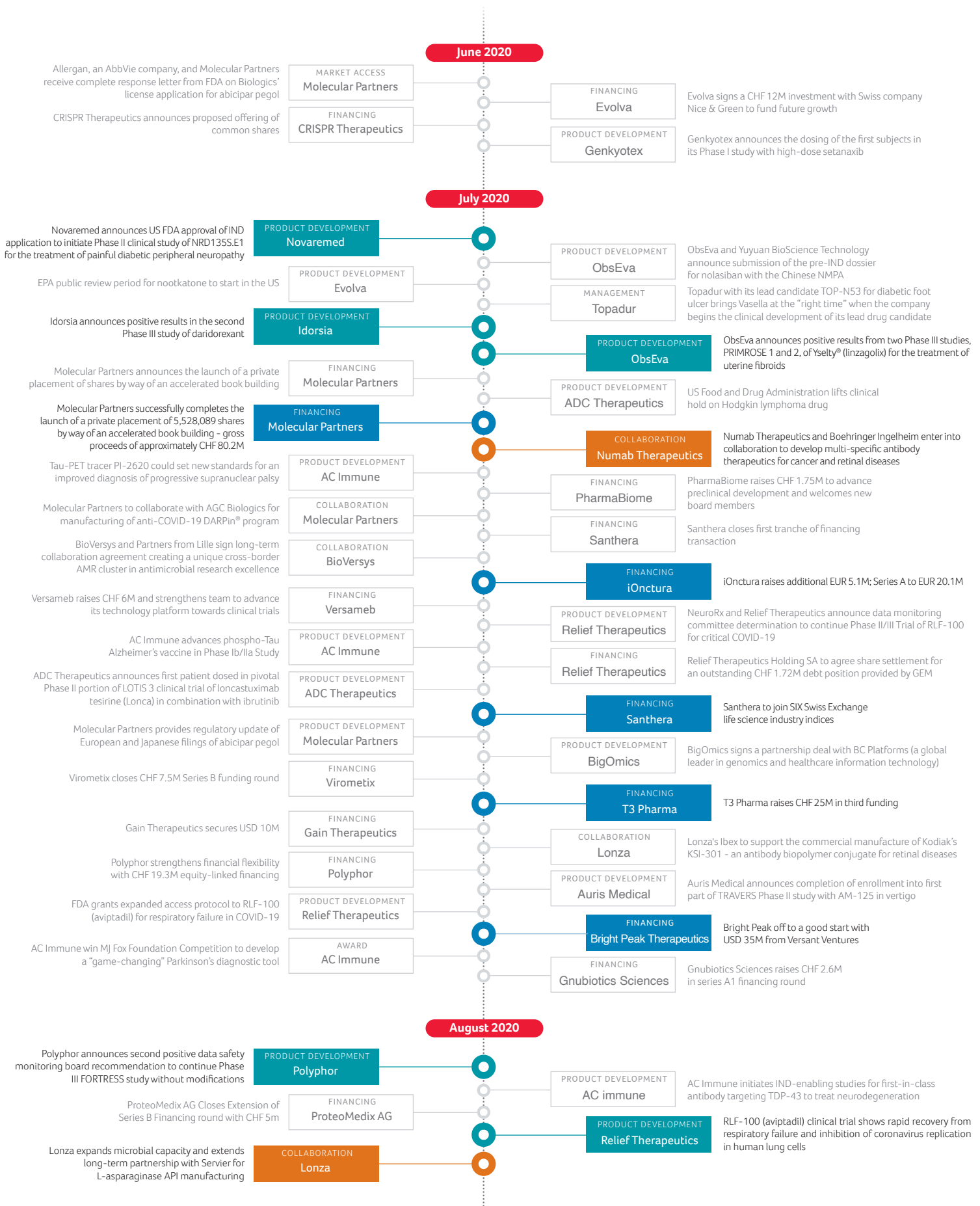
Swiss Biotech Events of 2020



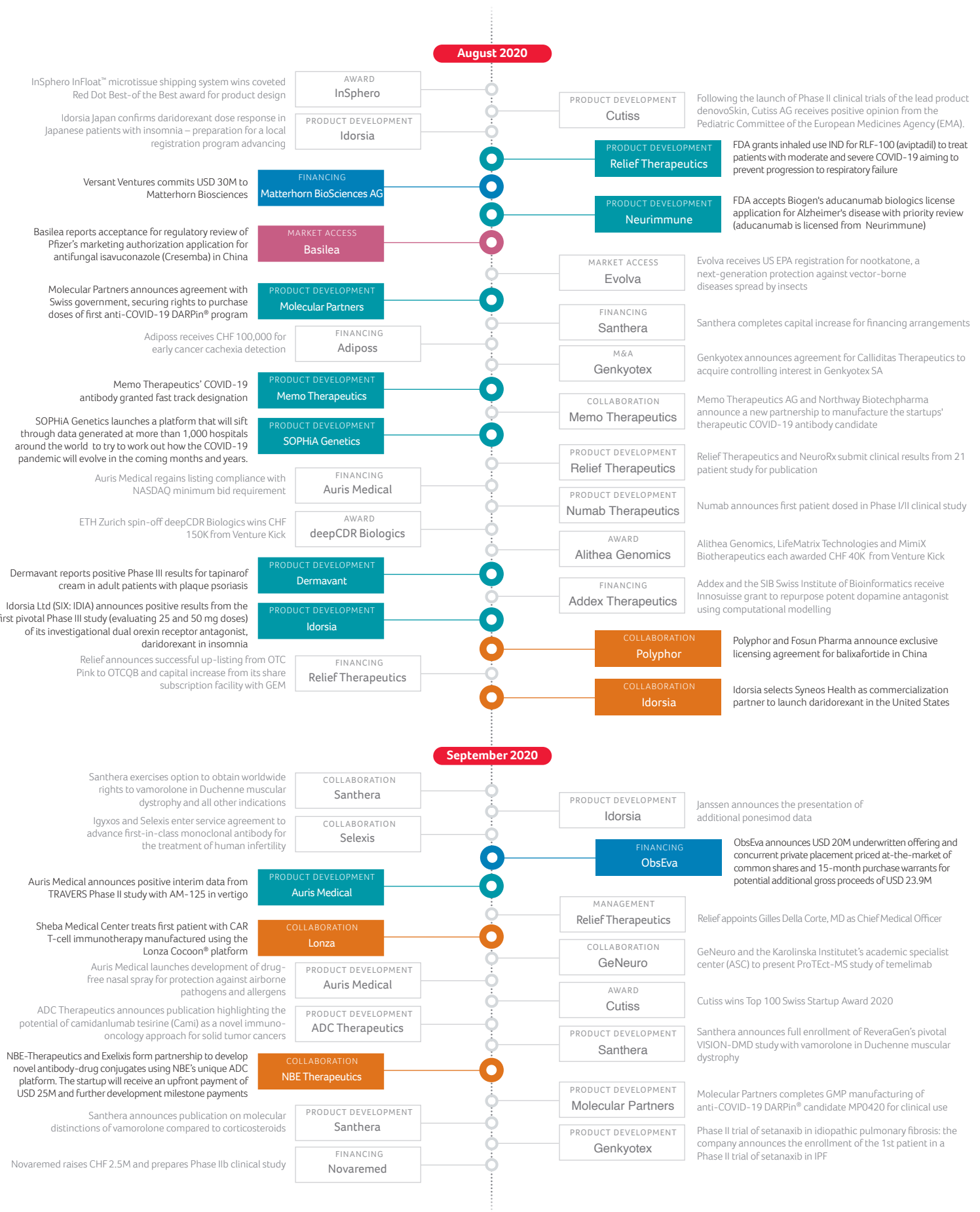


Swiss Biotech Events of 2020





Swiss Biotech Events of 2020



September 2020

ADC Therapeutics announces presentation of preliminary findings from Phase Ib clinical trial of camidanlumab tesirine (Cami) in advanced solid tumors

Relief and NeuroRx announce partnership for global commercialization of RLF-100™ and selection of commercial partners

Santhera announces publication of long-term clinical data with vamorolone in patients with Duchenne muscular dystrophy

Relief partner NeuroRx submits request for emergency use authorization for RLF-100™ (aviptadil) in the treatment of patients with critical COVID-19 and respiratory failure who have exhausted approved therapy

EU Prize for Women Innovators 2020; Madiha Derouazi, founder and CEO of Amal Therapeutics is among the winners

Relief announces capital increase from its final tranche of the share subscription facility with GEM

Basilea initiates targeted biomarker-driven Phase II study with lisavanbulin in patients with brain cancer

NeuroRx and Relief Therapeutics establish supply and distribution agreements for RLF-100™ (aviptadil)

Polyneuron extends Series A to CHF 36.5M by raising an additional CHF 14M to advance its lead product candidate

LamKap Bio Group and Lonza collaborate to manufacture bispecific antibodies for cancer treatment

ADC Therapeutics submits Biologics license application to the US Food and Drug Administration for loncastuximab tesirine for treatment of relapsed or refractory diffuse large B-cell lymphoma

CRISPR Therapeutics and Vertex Pharmaceuticals announce priority medicines (PRIME) designation granted by the European Medicines Agency (EMA) to CTX001™ for the treatment of sickle cell disease

Molecular Partners presents preclinical data supporting tumor localization mechanism of its CD40 agonist MP0317

Basilea starts Phase I/II study FIDES-03 with derazantinib in patients with gastric cancer

Polyphor announces closing of Fosun Pharma licensing agreement for balixafortide in China and receipt of USD 15M upfront payment

Numab announces Daniel Vasella as new Chairman of the Board

October 2020

SOPHiA GENETICS raises USD 110M in oversubscribed funding round.

Santhera to discontinue Phase III SIDEROS study and development of Puldysa® in Duchenne muscular dystrophy (DMD) and focus on vamorolone

CRISPR Therapeutics congratulates co-founder Emmanuelle Charpentier on receiving the 2020 Nobel Prize in Chemistry.

ADC Therapeutics announces full exercise of underwriters' option to purchase additional common shares

Auris Medical announces initiation of Part B of TRAVERS Phase II study with AM-125 in vertigo

Polyphor receives CARB-X award of up to USD 18.44M to support development of new antibiotic program.

Chord Therapeutics launches with USD 16M Series A financing

Genkyotex's setanaxib granted orphan drug designation by the US FDA for the treatment of PBC.

Santhera completes capital increase for financing arrangements.

Basilea presents preclinical data on anti-angiogenic activity of derazantinib.

Molecular Partners announces collaboration with Novartis to develop two DARPin® therapies designed for potential use against COVID-19

Polyphor completes recruitment in Phase III trial of balixafortide in metastatic breast cancer

Genmab and ADC Therapeutics announce amended agreement for camidanlumab tesirine (Cami)

Oculis presents positive results from Phase II trial of drug for diabetic macular edema

Molecular Partners demonstrates reduction of mortality and potent therapeutic activity of anti-COVID-19 DARPin® candidates in advanced COVID-19 disease model.

Competitive EU grant supports collaboration to accelerate development of AC Immune's first-in-class TDP-43 diagnostic agent

NeuroRx and Relief announce top line efficacy data from patients treated with RLF-100(TM) (aviptadil) under the US FDA expanded access protocol authorization for respiratory failure related to critical COVID-19

Basilea reveals promising Phase Ib data of derazantinib/atezolizumab in treating advanced urothelial cancer

VectivBio raises USD 110M to advance rare disease pipeline including short bowel syndrome with intestinal failure in phase III

Versantis receives FDA rare pediatric disease designation for VS-01 for the treatment of urea cycle disorders.

CRISPR Therapeutics reports positive top-line results from its Phase I CARBON trial of CTX110™ in relapsed or refractory CD19+ B-cell malignancy.

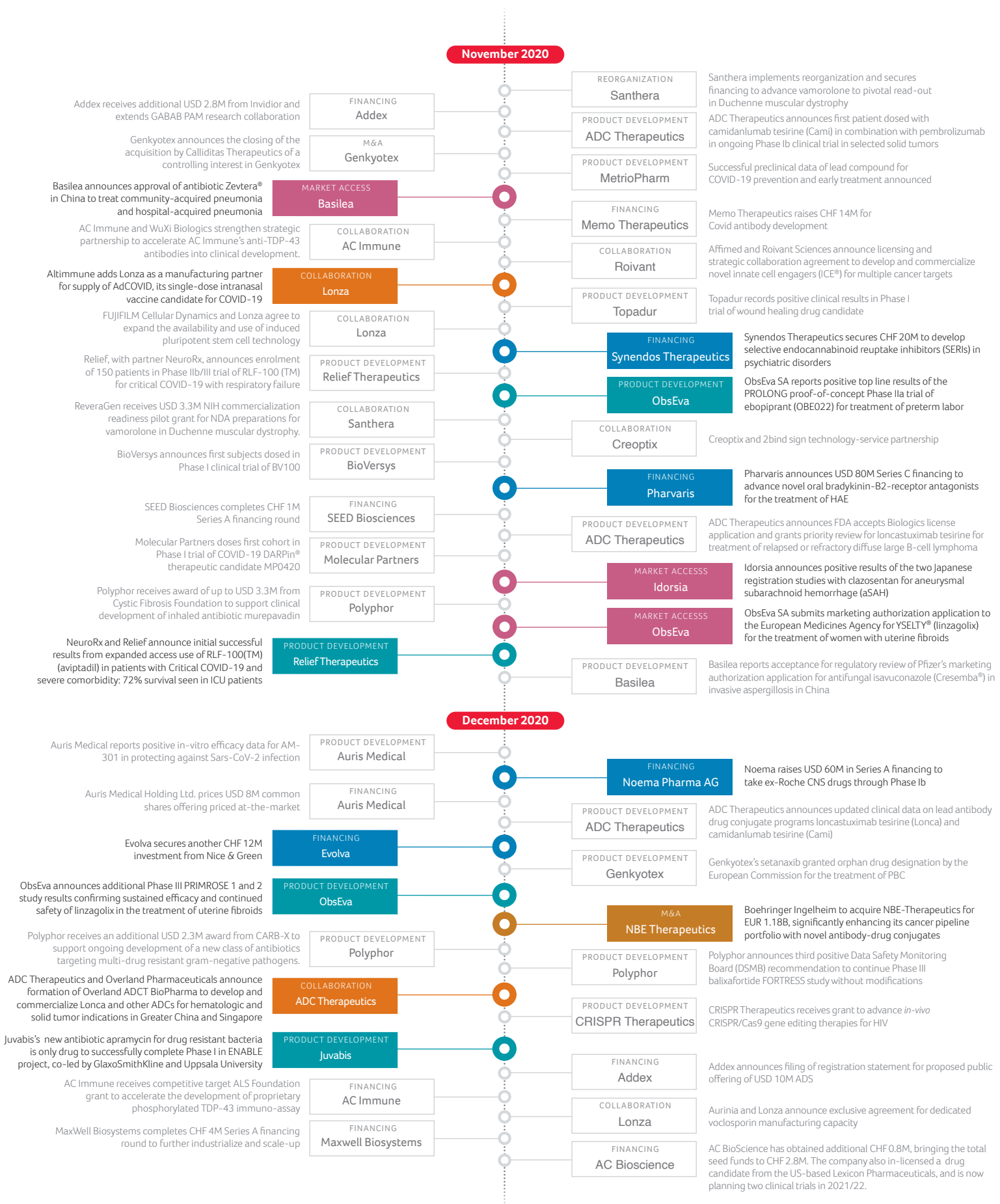
Araris Biotech AG announces the completion of a CHF 15.2M seed financing round

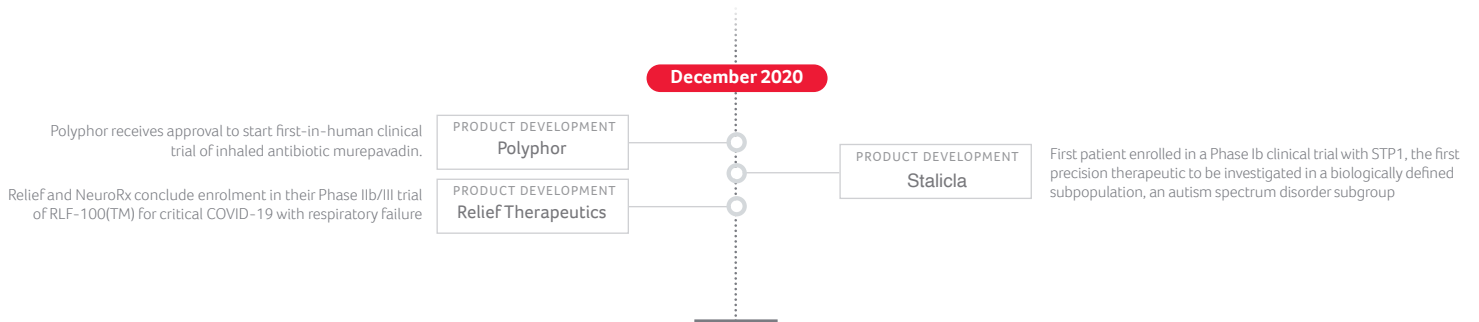
Basilea announces clinical trial collaboration and supply agreement with Eli Lilly and Company for ramucirumab in the ongoing FIDES-03 study with derazantinib in gastric cancer

First-in-Human study of NBE-Therapeutics' lead program NBE-002 targeting ROR1, for triple-negative breast cancer and other solid tumors begins.

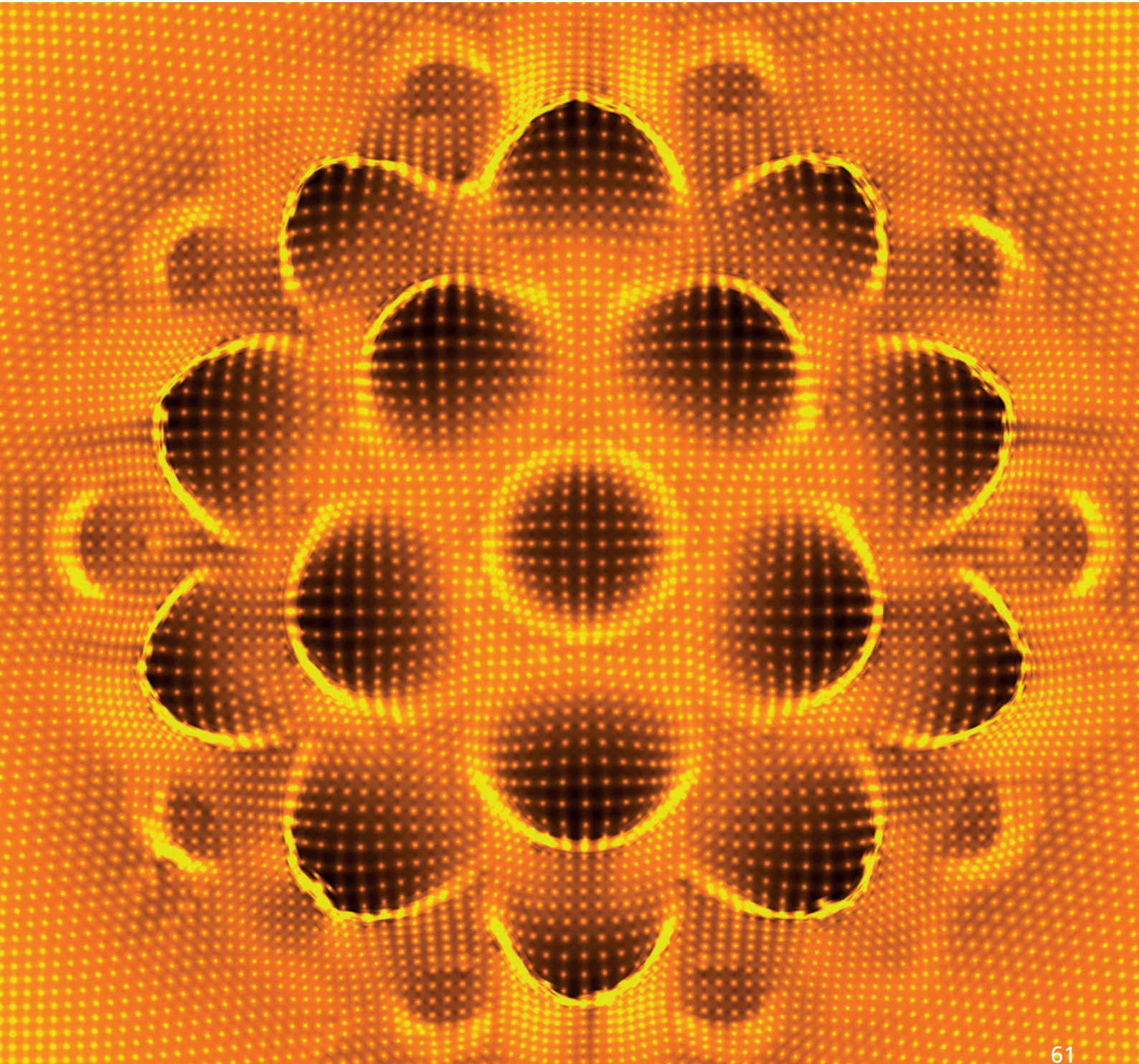
Lonza announces agreement to manufacture AstraZeneca's COVID-19 long-acting antibody combination

Swiss Biotech Events of 2020





Disclaimer: This information was selected and compiled on the basis of publicly available information only. We therefore cannot guarantee that all events are included in the above summary for 2020.



Swiss Biotech Report: Contributors' Profiles

Swiss Biotech Association

The Swiss Biotech Association represents the interests of the Swiss biotech industry since 1998. To support its members in a competitive market, the Swiss Biotech Association works to secure favorable framework conditions and facilitate access to talents, novel technologies and financial resources. To strengthen and promote the Swiss biotech industry, the Swiss Biotech Association also collaborates with numerous partners and life science clusters globally under the brand Swiss Biotech™.

www.swissbiotech.org

EY

EY is a global leader in assurance, tax, transaction and advisory services. The insights and quality services we deliver help build trust and confidence in the capital markets and in economies the world over. Our Global Life Sciences Sector brings together a worldwide network of 15,000 sector-focused professionals to anticipate trends, identify their implications and help our clients create competitive advantage.

www.ey.com/lifesciences

scienceindustries

scienceindustries is the Swiss business association of chemistry, pharma and life sciences. It supports some 250 member companies: fostering an innovation-friendly environment in Switzerland, creating a competitive production and business framework, enabling attractive market conditions, and facilitating worldwide market access.

www.scienceindustries.ch

Swiss National Science Foundation

The Swiss National Science Foundation (SNSF) is the most important agency promoting scientific research in Switzerland. As mandated by the Swiss Federal Government, the SNSF supports research in all scientific disciplines, from philosophy and biology to the nanosciences and medicine. The best applicants are funded to the tune of over CHF 900M each year. The SNSF supports over 6,000 projects involving more than 16,000 researchers annually.

www.snsf.ch

Swiss Federal Institute of Intellectual Property

The Swiss Federal Institute of Intellectual Property is the official government body for intellectual property rights in Switzerland and is responsible for examining, granting and administering these rights. The institute's services also include training courses on various aspects of intellectual property and tailor-made searches for trademarks and patent information, including strategic patent analyses involving patent quality parameters.

www.ige.ch

biotechnet

biotechnet Switzerland is the network of Universities of Applied Sciences, Universities and Research and Technology Organizations organized in 10 thematic platforms. As such, it represents an excellent means to channel access to a wide variety of competencies in biotechnology to support the biotech industry.

www.biotechnet.ch

Swiss Academy of Engineering Sciences SATW

SATW is a network of engineering experts contributing to the progress and competitiveness of the Swiss economy. Positioning Switzerland in a leading role is one of the key goals of the academy, and we work to identify promising technologies and assemble the best experts to foster innovation. SATW is also the leading organization for encouraging young women to pursue a career in a technical field.

www.satw.ch

SIX

The Swiss Stock Exchange combines the dynamism of Europe's 4th biggest stock exchange with the stability and reliability of one of the industry's most respected post-trade service providers. The Swiss Stock Exchange blends the geographical advantages of the Swiss financial center with first-class services making it an ideal listing location for companies of every origin, size and sector. The Swiss Stock Exchange is part of SIX, which offers comprehensive services in the areas of securities trading, clearing and settlement as well as financial information and banking services.

www.six-swiss-exchange.com

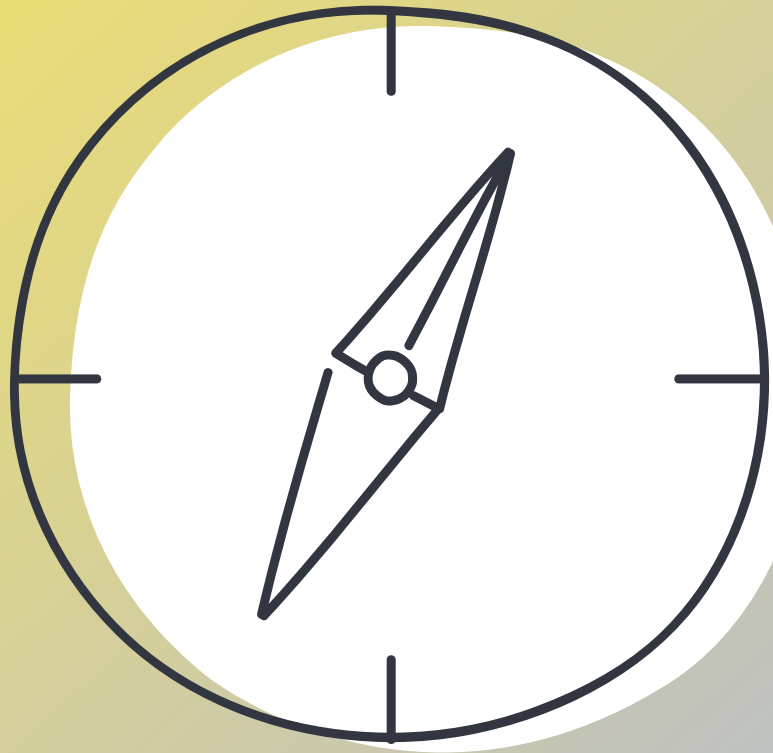
Switzerland Global Enterprise

Switzerland Global Enterprise (S-GE) is mandated by the Swiss government for export and investment promotion. In its role as a center of excellence for internationalization, its mission is to help Swiss SMEs develop new potential for their international business and to strengthen Switzerland as an economic hub. S-GE assists foreign companies in evaluating Switzerland as a business and technology location, and together with its cantonal partners helps companies during the entire site selection and incorporation process.

www.s-ge.com/invest-biotech

The contributors have been listed in order of appearance in this report

Navigation for your innovation



www.innosuisse.guide

The Innosuisse Guide helps you find the right support offer in just a few steps. From individual advice through to national and international networking opportunities and financial support.



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