

Swiss Biotech Report 2013

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Editorial

In a rapidly changing global market, the ability of a country to compete is dependent on an efficient transfer of know-how and creativity into innovative products and services. Given Switzerland's lack of natural resources, this transfer is crucial for prosperity.

When it comes to scientific publications and patents, Switzerland is a world leader on a per capita basis. However, sustainable prosperity depends on constantly renewing and fuelling our science and technology institutions and on rapidly turning know-how and innovation into business models and products.

Swiss Biotech has continued to demonstrate sustained inventiveness and success. As a result, chemicals, pharmaceuticals and biotechnology were Switzerland's largest (38%) export industry in 2011.

The OECD, the EU and most national governments recognize biotechnology as one of the critical factors for sustainable economic growth. Biotechnology not only produces tangible results such as new therapeutics but is also a versatile technology relevant to many industries other than healthcare. For example, biotechnology may be used in the future to meet the challenges of environmentally sustainable production. Biotechnology is, and will be even more so in the future, influenced not only by the biotechnology industry but also by public research support, regulations, intellectual property rights, and social attitudes.

In this year's Swiss Biotech Report we focus on how to turn know-how into products, services and innovation. The relevant Swiss stakeholders in the biotech value chain will lead you along the challenging path from the generation of know-how, via the protection of inventions, to the creation of a product and successful introduction into the market.

The steering committee

Domenico Alexakis
Anna Bozzi
Oreste Ghisalba
Heinz Müller
Ori Schipper
Andrea von Bartenwerffer
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Know-how as product:
preparing the ground



Biotechnology, an important source of know-how



Domenico Alexakis,
Swiss Biotech Association



Daniel Gygax,
biotechnet Switzerland &
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of Northwestern Switzerland

As a country, Switzerland has one of the highest ratios of R&D expenditure to gross domestic product. This accounted for 3% of GDP or CHF 16.3 billion in 2008, with some 73% or CHF 11.98 billion of the overall R&D activities being performed within private industry and 24% within academia. Biotechnological R&D accounts for CHF 1.5 billion or 13% of the overall R&D activities in industry (bfs, 2010).

Biotechnology provides Switzerland, Europe and the world with the potential to accelerate the transition to a more sustainable growth model; one that is built on remaining competitive and creating high-value and high-tech know-how. A strong and competitive life-sciences sector can generate and maintain high quality jobs in both rural and urban settings.

The potential of biotechnology and its strategic importance is set out in various international policies, including 'The Bio-economy to 2030' by the OECD, the EU Commission's official 'Life Science and Biotechnology Strategy and Action Plan' and research and education programmes such as 'Horizon 2020'. The strategic importance of biotechnology to Switzerland is reflected in the level of public investment in life sciences research. Biotechnology is a versatile tool which offers a broad range of techniques that are applicable to many industries. It is helping to improve economic sustainability by bringing environmental advantages and competitiveness. In Switzerland it has the potential to contribute to the transformation of economic models. Time and time again it demonstrates that it can provide the basis for tackling today's health challenges and those of tomorrow.

Institutions and processes to create and generate know-how

Swiss universities are well-established centres of excellence in the fields of basic and applied research for biology, biotechnology and process engineering. They include the Swiss Federal Institutes of Technology in Zürich (ETHZ) and Lausanne (EPFL); the universities of Bern, Basel, Fribourg, Geneva, Neuchâtel, Lausanne and

Zürich, the university hospitals and the universities of applied sciences in Muttenz, Sion, Fribourg and Wädenswil, as well as the biomaterials laboratory at EMPA. All of these centres make a fundamental contribution to the development of a strong pool of qualified and competitive professionals who can help maintain the Swiss biotech industry's leadership position in the world.

For over 10 years, the academic R&D network *biotechnet* has made a significant contribution to the education of those studying for degrees in biotechnology, chemistry and life sciences. It has also been involved in the delivery of results on some important projects for the biotech industry. Important, applied project work is particularly beneficial to niche-oriented SME companies.

Today the funding for research in Switzerland comes from three principal sources: private funding from individual companies; the *Swiss National Science Foundation (SNSF)* which finances basic research with public funds; and the *Commission for Technology and Innovation (CTI/KTI)* which concentrates on applied research projects between academia and business.

“Switzerland considers education, research and innovation to be a top priority.”

*State Secretariat for Education,
Research and Innovation (SERI), www.sbfi.admin.ch*

The *Swiss National Science Foundation (SNSF)* is the country's foremost institution for the promotion of scientific research. One of its core tasks is the evaluation of research proposals. Every year, it awards over CHF 700 million to the best applications. By distributing public research money, based on a competitive system, the foundation helps to maintain the high standards of Swiss research.

To ensure its independence, the SNSF was established as a private foundation in 1952. Mandated by the federal authorities, it supports basic science in all academic disciplines, from history through to medicine and engineering sciences. In close collaboration with higher education institutions and other partners, the SNSF helps to create the best possible conditions for the development and international integration of Swiss research. The SNSF is paying particular attention to the support of young scientists. >> page 8

The *Commission for Technology and Innovation (CTI)* is the federal administration's decision-making body for all matters pertaining to the promotion of innovation. The CTI reports directly to the Federal Department of Economic Affairs, Education and Research (EAER). Its remit is to promote R&D projects and entrepreneurship. It provides assistance with the creation and

biotechnet Switzerland, the network of the Swiss Universities of Applied Sciences (UAS) and Empa's biomaterials group, is the one-stop shop for innovation in technology where companies – especially small and medium-sized ones – can easily find the specialist contact person for a specific development. For further information visit www.biotechnet.ch

“Education and research play a decisive role in the creation, dissemination and use of knowledge. They form an important foundation for innovation at all levels, which in turn drives the economic, social and cultural development of a country.”

*State Secretariat for Education,
Research and Innovation (SERI), www.sbfi.admin.ch*

development of start-up companies and seeks to optimise knowledge and technology transfer through the use of networks, platforms and other initiatives.

Through its Knowledge and Technology Transfer (KTT) promotion programmes, CTI offers Swiss companies swift and easy access to knowledge in universities and public research organisations at home as well as providing direct links to international promotion programs for applied research. >> [page 9](#)

Institutions and processes to secure know-how

Securing ‘know-how as a product’ starts with securing the Intellectual Property (IP), either at public or private institutions. Well respected institutions in the patent industry such as *the Swiss Federal Institute of Intellectual Property (IGE)* or the rapidly developing technology transfer organizations of academia demonstrate that the Swiss ecosystem functions well. The *Swiss Federal Institute of Intellectual Property (IGE)* is the federal government’s competence centre for all IP matters. It provides academia, start-up companies and large corporations with tailor-made IP services of the highest quality. Particularly noteworthy is the provision of patent searches and help with the vastly important issue of patents as intangible assets. These need to be monetized for a host of reasons, not least their use as investment collateral. Efforts to put a price on patents and to standardize their valuation are ongoing. >> [page 12](#)

Financing and sustaining the generation of know-how

Financing is one of the main pillars for the economic success of biotechnology products and know-how generation along the length of the value chain. Valuation of know-how and usage as a company asset are the topics of industry talks and training in Switzerland and abroad.

The investment community is active worldwide and reflects the truly global spirit of biotechnology. Switzerland has both a long tradition of financing life sciences stocks and an existing expertise in valuing them. The country’s internationally oriented and potent capital market with its securities exchange – *SIX Swiss Exchange* – holds a strong appeal for Swiss and foreign life sciences companies and provides fertile ground for growth and prosperity. >> [page 14](#)

Exporting know-how: the specialties strategy

The Swiss chemical, pharmaceutical and biotech industry exhibits rapid and significant development in specialties. Almost 90% of its overall product portfolio is made up of innovative high-value specialties; a remarkable share when compared to the international average. Swiss companies have established a worldwide presence and are often market leaders. The sector shows a marked international orientation, with just 5% or so of sales in the Swiss market.

scienceindustries is the Swiss business association for the chemical, pharmaceutical and biotech industries. It supports the sector by advocating an internationally competitive framework that can further expand Switzerland’s leading position as an attractive location for chemical, pharmaceutical and biotech companies over the next 20 years. >> [page 20](#)

The *Swiss Biotech Association (SBA)* is the national industry association representing companies working with biotechnological tools in the research and development of therapeutics, diagnostics, agricultural and nutritional products, environmental and specialty chemicals. Member companies represent all aspects of the business throughout the value chain, including supply, finance, and services and consulting. *scienceindustries* and *SBA* work together to partner with specialist private and public institutions to further their members’ business development, both nationally and internationally.

Swiss Biotech – 1Nation 1Cluster

Know-how and innovation are the basis of our prosperity. It is the only source of advances in productivity that will never run dry. High levels of income and a flexible economy are dependent on businesses being successful in the global innovation competition stakes. However, the value chain of innovation in biotechnology is extremely complex and an essential ingredient of success is the cooperation of all stakeholders in the process of know-how creation, protection and valuation.

As of 2013 the National Thematic Network Swiss Biotech™, led by biotechnet and the Swiss Biotech Association™, aims to foster transfer activities in biotechnology.

The Swiss Biotech Association (SBA) was founded in March 1998. Today more than 220 companies represent the national association. SBA is the industry association of small and medium-sized enterprises active in all areas of biotechnology as well as a highly respected networking platform for the multinational companies active in the sector. For more information visit www.swissbiotech.org

Fluid boundaries in the generation of know-how



Ori Schipper,
Swiss National Science
Foundation (SNSF)

Research is increasingly acknowledged as the driving force in a country's development. The Swiss National Science Foundation (SNSF) has created various funding instruments to ensure that research results are channeled as directly as possible into society.

Switzerland's innovation performance ranks at the top of the International Union Scoreboard. Its scientific productivity, as measured by the number of highly-cited research publications per year, and per million inhabitants, also ranks very highly in international comparisons. If a country's development depends on research and value-creation based on knowledge and innovation, then Switzerland seems well prepared for the future.

Visibility of leading-edge Swiss research

The National Centres of Competence in Research (NCCR) have contributed in no small way to this. Since they were launched in 2001, they have not only created strong networks of researchers at various institutions in Switzerland, they have also made leading-edge Swiss research more visible at both a national and international level. Moreover, NCCRs have proven to be a successful means of knowledge and technology transfer.

The first set of NCCRs is being phased out in 2013, having run for 12 years. In this time the five NCCRs with a focus on life-sciences – CO-ME, Genetics, Molecular Oncology, Neuro and Structural Biology – entered into 379 partnerships with com-

panies and founded or supported 24 start-up enterprises (see table below). These enterprises have brought 51 different products to the market, with another 47 products still being in the pipeline. Additional methods and products are being developed in partnership projects.

Use-inspired basic research projects

By creating the category 'use-inspired basic research' in July 2011, the SNSF acknowledged that 'basic' and 'applied' research are no longer poles apart even if the former strives for new insights and the latter for marketable products. In today's research environment the two aspects are interconnected and the boundaries between the two have become fluid.

The new category, devised by the SNSF, mirrors the changes in society and takes into account the growing national and international significance of scientific research that targets both knowledge and application. Many research projects are aimed at application in its broad sense. They often involve partners from the practical realm, who give the initial impetus or are looking to implement the results.

The SNSF does not fund use-inspired research aimed at immediate commercial exploitation of results, but supports applied research that focuses on generating scientific knowledge while addressing research questions of a practical nature. A new criterion, "broader impact", has been added to the set of criteria by which applications involving applied research are judged. For such applications, additional reviews from external experts from the practical realm are solicited.

In 2012, the SNSF supported 169 use-inspired projects out of a total of 1,197 funded projects. Its Biology & Medicine division funded 43 use-inspired projects.

NCCR	Start-up companies	Joint projects with industrial partners	Follow-up projects at CTI
CO-ME	11	169	36
Genetics	5	41	1
Molecular Oncology	0	64	1
Neuro	6	53	14
Structural Biology	2	52	2
Total	24	379	54

The Swiss National Science Foundation (SNSF) is the most important Swiss agency promoting scientific research. As mandated by the Swiss Federal Government, SNSF supports all basic research in all scientific disciplines, from philosophy and biology to the nano-sciences and medicine. The focus is on the scientific assessment of projects submitted by researchers. The best applicants are funded by the SNSF to the tune of around CHF 760 million each year. The SNSF supports some 7,000 researchers annually, of whom at least 5,500 are aged 35 years or under. www.snf.ch

CTI: reorganization and extension of support for knowledge and technology transfer



Oreste Ghisalba,
Commission for Technology
and Innovation (CTI)

The Commission for Technology and Innovation (CTI) has three pillars in its programme to promote innovation. Knowledge and Technology Transfer (KTT) is the third pillar after R&D Support and Start-Ups and Entrepreneurship. The aims and objectives of KTT are to shape and support cooperation between research institutions and private-sector businesses. The desired output is innovation that benefits both parties: business accesses the development opportunities provided by universities and research partners benefit from practical exposure to the business world.

A good KTT promotional programme supports all parties in their search for a partner and enhances readiness and the foundations for a successful innovation process. Technology transfer travels in both directions: knowledge and technology passes from the scientific sector to the business world while market insights are fed back in to the research sector. This enables the transfer of business know-how in to the scientific sector.

Over the past two decades, KTT support in Switzerland has developed well, in large part due to the excellent work of established local and cross-cantonal, networks. The CTI helped to support this by establishing KTT consortia and thematic networks (in the form of R&D consortia) and by promoting important events. Other players have also enriched the market, taking on additional tasks and creating a wide range of offerings in the process.

Despite the quality of those involved, the visibility of local support systems suffered. An external evaluation of the KTT and R&D consortia - a comprehensive audit and an OECD study (territorial examination of Switzerland) - indicated that moving forward, KTT structures should be better positioned to meet the needs of SMEs (small to medium sized enterprises). To this end, transfer from the business world to the scientific sector should be strengthened and SMEs should be helped to set out their knowledge and technology needs. Promotion activities are to be more closely aligned with topics that are relevant to Switzerland in terms of innovation potential and business development.

In 2011 and 2012, the CTI developed and implemented new

strategies for promoting KTT, based on the audit and evaluation results. The new promotion strategy has three elements, which all come into operation in 2013 with four to eight year operation horizons:

1. National thematic networks (NTNs)
2. Innovation mentors (IMs)
3. Physical and web-based platforms

National thematic networks (NTNs)

NTNs help to establish contacts between businesses and public research institutes. Each NTN deals with a different area of innovation that is important to the Swiss economy. Following a multi-stage assessment procedure in 2012, eight NTN proposals were approved:

1. Carbon Composites Switzerland
2. Inartis
3. Innovative Surfaces
4. Swiss Biotech™
5. Swiss Food Research
6. Swiss Wood Innovation Network
7. Swissphotonics
8. Logistics Network Association

These networks replace all previously existing CTI R&D and CTI KTT consortia. Significantly, three out of these eight newly-established NTNs relate to life sciences: *Swiss Biotech™*, *Swiss Food Research* and *Inartis*. This underlines the importance attributed to the further development of life sciences in Switzerland.

Innovation mentors

Innovation mentors (IM) are CTI advisors who have many years of private sector experience and can act as direct contact persons for SMEs. They are familiar with, and understand, the innovation challenges and needs faced by companies and can help them find the right research partners in academic institutions. They aim to create contacts and identify, specify and implement ways of encouraging innovation.

The work of an IM is in addition to that of the regional and cantonal technology advisors. Eight IMs will be working for the CTI from 2013. If this work is well received and there proves to be a greater need amongst SMEs, then additional IMs may be recruited.

The innovation promotion agency Commission for Technology and Innovation (CTI) supports R&D projects, entrepreneurship and the development of start-up companies. CTI helps optimize knowledge and technology transfer through the use of networks, mentors and platforms. Support is generally available for R&D projects relating to scientific innovations in all disciplines. Project proposals are submitted using the bottom-up principle and are mainly selected on the basis of their innovativeness and market potential. www.kti-cti.ch

NTNs and IMs work closely together but prepare their output independently and at different levels. A NTN focuses on a topic at the national and international levels and builds up an innovative and relevant network. The IM focuses on an individual local company, is familiar with the support systems, and establishes links to new partners.

Physical and web-based platforms

The KTT platforms bring together representatives from the worlds of business and science and provide a physical and interactive interface between innovation mentors and the NTNs. Contacts can be made and maintained and key issues, which SMEs are likely to face in the future, can be discussed. The platforms will be rolled out over the course of 2013.

NTNs related to life sciences

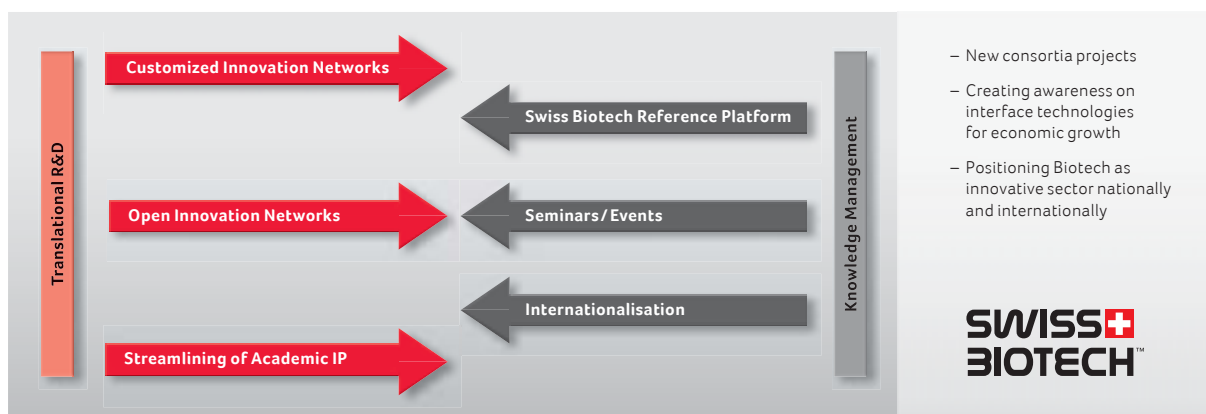
The *NTN Swiss Biotech™* unites R&D and KTT-related activities of the *Swiss Biotech Association* and *biotechnet Switzerland*. The NTN

represents a further step towards the integration of biotechnology in Switzerland. It covers all relevant competences across the entire value generation chain; from innovation through to product development and commercialization. The twin pillars of translational R&D and knowledge management are organized in six operational fields (Fig. 1).

The *NTN Swiss Food Research* aims at research-based innovations for the food value chain (from farm to fork and from stable to table) with special consideration of the specific needs of food industry and society. *The strategic research agenda 2009-2020 Food for Life Switzerland* serves as a guiding document for the further development of the NTN.

The *NTN Inartis* centers its activities on the trans-disciplinary interfaces between biotechnology and the other disciplines of life sciences. It follows a KTT strategy based on 'community sourcing' and 'brain processing'. The NTN will be active nationwide and will cooperate with existing networks and a pool of hundreds of interdisciplinary senior-experts.

Figure 1: Activity Fields of NTN Swiss Biotech™



Half-day patent searches for SMEs

The *Commission for Technology and Innovation (CTI)*, in partnership with the *Swiss Federal Institute of Intellectual Property (IPI)*, will once again offer free half-day patent searches to SMEs starting from 3 December 2012. This is a follow-up to the successful CTI-IPI partnership that began within the framework of the special series of measures taken in 2011. It is also in response to numerous requests by SMEs that this initiative be continued in the context of R&D project promotion. For further information refer to www.kti.admin.ch/projektfoerderung/00203/

Know-how as product:

IP protection and valuation



Patents: their value and valuation as assets



Heinz Müller,
Patent Expert,
Swiss Federal Institute
of Intellectual Property

The importance to the life sciences industry of intangible assets such as know-how, skills and intellectual property is self-evident. This industrial sector is knowledge-driven, so intellectual property plays a major role in the performance of companies working in the field. Furthermore, protecting intellectual property rights such as patents, enables these companies to convert intangible knowledge into tangible assets that have a monetary value and can be traded.

Numerous studies report that intangible assets represent at least 70% of corporate value. Some argue that among these, intellectual properties are the most valuable assets after human capital (i.e. its people) that a business owns. So, in an increasingly knowledge-based economy, patents have become a crucial asset of technology-driven companies.

Patent protection grants the owner exclusivity for a specific market for a set time period. Its importance was recognized well before the big courtroom battles between Apple and Samsung. A century earlier, Thomas Alva Edison accumulated 2,332 patents for a lifetime of inventions including the phonograph, the kinescope, the dictaphone, the radio, the electric lamp and the autographic printer.

Early on in biotechnology patents were also recognized as being valuable assets. Few industries depend on intellectual property protection to quite such an extent. The most valuable patents in biotechnology include the Cohen-Boyer patents of 1980, 1984 and 1987, which protect the basic tools of genetic engineering and patents for PCR, insulin, interferon and erythropoietin.

Swiss performance

Switzerland generates only a fraction of the biotech documents published worldwide but per capita the country is amongst the world leaders when it comes to scientific publications (predominantly from universities) and patent documents (predominantly from industries). The number of patent documents published each year by US assignees is about one third of the Swiss rate. And last year the number of biotech patent documents published by German or British assignees was a seventh of the number from Switzerland. In recent years, these numbers have been relatively stable indicating that for its comparative size, Switzerland boasts strong R&D in biotech.

Switzerland's position as a major global financial center coupled with the high priority put on a workforce that is highly skilled and educated and strongly oriented towards high-tech, creates a natural combination. Know-how and intellectual property may be intangible assets with no clearly defined monetary value, but they can be converted into a tangible asset by

obtaining a protection right such as a patent, for specific aspects of know-how. These protection rights can then be sold or licensed to others for a specific price. Thus, the sale or licensing price represents the monetary value of the protected intellectual property.

The value of intellectual property

The income from licensing proprietary technologies protected by patents, represents a growing part of the total revenue for many companies around the world. So patents constitute an ever larger component of business performance. They also serve an important role in demonstrating to potential investors, a biotech company's technical competencies and the possibility of keeping the competition in a specific market at a distance. This enables start-up companies specifically to attract venture capital and/or the interest of large pharmaceutical or chemical companies, or get national or international service contracts. Venture capitalists almost exclusively invest in companies with patents so that these can also be used as investment collateral if things go wrong.

“Patents perceived as assets present a challenge in terms of valuation, but they can be essential for a company's success.”

*Alban Fischer, Vice Director and Head of the Patent Department
Swiss Federal Institute of Intellectual Property*

Of course, not all patents are equally valuable on the world intellectual property market. So there is a need for tools to evaluate patents for selling, licensing, risk analysis, accounting, and tax purposes. In principle, there are three different approaches to monetary valuation of intangible assets such as patents: *the market, the income and the cost approach*.

The *market approach* relies on the prices regularly paid on the open market for similar patents. It is specifically suitable for sectors with high unit quantities and mass production, where known sales scenarios and established spreads are in place. A market approach is generally a forward-looking method because the formation of market prices is based on assumptions about future earnings from patent trading and maybe other factors. However, the market for patents is relatively small when compared with the total number of patents issued per year (about 2.2 million including utility models). So the approach may only work where comparable market values are available.

The second method is the *cost approach*, which takes into account the cost generated for the redevelopment of the technology or its replacement. The weakness of this approach is that this is based on historic data instead of being future-oriented. The third method, based on *income*, uses discounted cash-flow from the exploitation of the patent. This method depends on a

reliable prognosis of future revenue which may be very difficult to predict. Another possibility is to assess the so called 'saved license fees'; namely the fees that would have to be paid if the technology was licensed.

Above and beyond these three methods, are a number of additional approaches that have been developed and published, causing some confusion and disarray among those who need real information on the monetary value of patents.

Taking into account the diversity of approaches and their relative advantages and disadvantages, it becomes clear that the valuation of patents is not a simple task. It includes not only the assessment of the technical and legal aspects but also the business and economic environment and requirements. One must always keep in mind that any financial value should reflect expectation of future profit from a given patent. The method used should be as universal and flexible as possible and applicable to the different purposes of patent valuation.

Furthermore, valuation always depends on whether it is intended for selling, licensing, risk analysis, accounting, or tax purposes. Depending on the scope, the value of a patent may vary considerably and this can make its valuation seem somewhat subjective. Is this a dog chasing its own tail? One should know the value of a patent to decide on its fate but one should also know the fate of a patent in order to calculate its value. The big difficulty is that the outcome may differ considerably, depending on the method used to calculate the value for a specific purpose.

Standardizing valuation methods

To prevent such differences from occurring, efforts have been made to standardize methods for value calculations. In May 2011 the German DIN standard 77100 'Patent valuation - General principles for monetary patent valuation' was published. This DIN standard is a significant and valuable initiative for the acceptance and further development of patent valuations. DIN 77100 prioritizes the three valuation approaches (income, cost, and market) based on the availability and quality of relevant

data and their suitability for appropriate value measurement. With this standard in place, and maybe others to come from organizations such as the International Organization for Standardization (ISO), patent valuations should become more reliable, manageable and usable for companies, governments, banks, venture capitalists and the like.

Monetary valuation of patents is a major step towards bringing together the Swiss financial marketplace with the country's inventiveness. It may well be that in the future we will witness the financial community taking a growing interest in prospective assets hidden in patents, rather than concentrating on the financial statements and patent expiration dates of pharmaceutical companies.

Besides pointing to potential drug failure in clinical trials, patents can be an 'early warning and control system' for company earnings. Attaching a value to patents will enable wider trading of these assets and also allow their increased usage in forecasting a company's general performance.

The basis for the next multibillion dollar blockbuster?



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 tailor-made searches for trademarks and patent information and training courses on various aspects of intellectual property. For further information visit www.ige.ch.



How to secure funding for basic research in Switzerland?



Andrea von Bartenwerffer,
Senior Relationship Manager, Issuer Relations
SIX Swiss Exchange AG
(moderator)



Jürg Zürcher,
Partner,
Assurance Services,
Biotechnology Leader EMEA,
Ernst & Young AG
(moderator)

A discussion with

Dr. Marc Gitzinger, CEO, BioVersys

Dr. Marjan Kraak, ETH transfer

Bob Pooler, Senior Healthcare Analyst, valuationLAB

Harry Welten, MBA, CFO, Cytos

Dr. Andreas Wicki, CEO, HBM Partners.

Large pharmaceutical companies increasingly outsource basic research, because they are either heavily regulated or held back by rigid processes. And there is little time to pursue interesting discoveries. Now academia and small biotech companies are trying to bridge this gap.

Kraak: From the perspective of ETH transfer I can confirm this trend. Right from the early stages we see a strong interest from the industry to work with ETH Zurich. Last year, we launched an initiative to make the results of scientific research more quickly available to business and society, thereby fully exploiting its commercial value. The ETH Zurich Innovation and Entrepreneurship Lab (ieLab) brings together young talent from ETH Zurich, experienced entrepreneurs and alliance partners from the industry. An ieLab for the Life Sciences industry, where scientists and business people work together, is currently being built.

However there is a funding gap because the companies in the industry expect a finished product which ETH Zurich cannot deliver. There is a real need to close this gap and we believe this is one of the reasons why Novartis is preparing a seed investing initiative that focuses on interesting discoveries that have not yet been developed into spin-offs. We welcome this initiative because the commercialization of innovative ideas by academia is generally very difficult and because these are usually in the very early stages of development.

Gitzinger: Such initiatives are definitely welcome, but I think the real problem is still the gap between university research and the needs of the healthcare industry. The universities are primarily directed towards basic research and publications. In application-oriented research, one goes only up to the 'proof of concept' stage, possibly reaching a 'drugable target'. This is typically still a long way off from actual 'clinical drug develop-

ment' and beyond the reach of popular investment schemes. This is where I see one of the biggest hurdles for spin-offs. They must bridge this gap with seed capital, and this is difficult to find.

Welten: The classic model for financing biotech (Actelion is a good example) has become very challenging and is nowadays almost impossible. The strategic dilemma for today's drug developers is that investors are no longer willing to wait forever or accept high attrition rates. Two crucial elements are currently lacking: time and money.

Gitzinger: For me, the sticking point for life science innovations is that they are often rolled out too early from the university into a start-up. The situation for start-ups would be much easier if these innovators could stay a bit longer in a sort of incubator structure; being able to use the academic environment with dedicated innovation grants, two to three years on the way to application. In principle, this is currently often not of big interest for the universities and professors as there is a lot of repetitive work producing less ground-breaking science but often incremental results on the proof of concept publication.

Many of the development costs in pharmaceuticals are repetitive. CROs (clinical research organization), especially early stage, could do a similar job for many businesses in their catchment area. Here you could install centralized service hubs – possibly financed by the State or by the pharmaceutical industry – offering universities and start-ups cheaper alternatives for the more standard services. If it were possible to reduce these costs, I imagine attrition rates would improve because early phase projects could be evaluated more thoroughly. Fortunately the situation in Switzerland is promising with a large pool of professionals who have successfully completed the whole drug development process up to market. One should be able to tap into this know-how without each start-up having to set up their own structures for carrying out mundane and repetitive tasks.

Wicki: The CRO model is absolutely the right idea. Such businesses can be found already all over the world. From my point of view, it is essential that start-ups have easier access to quality CROs. China has produced enormous CRO centers, for example WuXi, which offers centralized services across chemistry and biology. As a biotech entrepreneur, you will not have to deal with mundane topics if you have access to the right resources. This reduces costs, and ultimately saves time because the programs are more or less standardized.

Pooler: I find this approach very exciting: you could provide such services directly into the Technology Parks. Perhaps this would also be an incentive for a young company to start offering a service to carry out clinical trials.

Wicki: There are enough studies to show that pharmaceutical companies and the larger biotech companies already outsource portions of their basic research – this doesn't differ so much from other industries. When one identifies the core areas of an indication and discovers a new 'drugable target' but does not want to tie up own resources, outsourcing is an elegant solution. Actually, you can 'kill two birds with one stone': on the one hand you increase efficiency and on the other, you provide young researchers with an incentive to do their best. This serves the interest of the inventor and also the sponsor.

The 'do-it-all-by-yourself' model has lost its power over the past 20 years.

Kraak: At the University of Zurich and the University Hospital, there is the Clinical Trial Center that has an office in the Bio-Technopark as well, which helps to plan and conduct clinical trials, and also supports start-ups in the area. The two institutions together with ETH Zurich have also launched an initiative called "Hochschulmedizin Zürich" to strengthen cooperation in research and development and in the areas between medical basic sciences, science and technology, clinical research and medical care. We are still at the beginning of the initiative and I think in the next two to four years you will see that start-ups find existing know-how a lot faster. And they will also find it easier to find life science industry partners and secure necessary funding.

Welten: I think this is an important point about financing. As an investor, I'm doing my 'back of an envelope' calculations and come up with a thousand reasons not to make the investment: it takes too long or it's too expensive. But where we all agree is that

innovation can only prosper if financial resources are allocated in the most appropriate form, scope and scale.

And the challenge now is, 'how do I get this money?'

Wicki: And in this area there are many initiatives and models for early financial support in Switzerland. Nowadays, almost every large pharmaceutical company and established biotech company supports seed, and early-stage, projects. The financial support is bundled into groups, which deal with potential indications and drugable targets, and then employ the most efficient and specific means, using existing know-how. And in Switzerland we are in the midst of this shift. Actually everything is moving in this direction. Because the search for attractive late-stage assets by, for instance, venture capitalists (VC), will dry up at some point, and one has to take care of the source. This is why within industry there is a general attention and move in this direction. From the society level, one could make a shift too, by better channeling public funds, donations, legacies or inheritances. There are different models, but there is no unification.



Participants of the panel discussion: Marc Gitzinger, Harry Welten, Bob Pooler, Marjan Kraak, Jürg Zürcher, Andreas Wicki (from left to right).
Not in the picture: Andrea von Bartenwerffer

Gitzinger: In my experience, seed funds from the pharmaceutical companies are often already very focused. One can actually speak of a kind of contract research that, if it doesn't prevent open research, certainly does not promote it. So it's not real outsourcing and I think that

in the early stages, in terms of maximizing innovation, a certain degree of flexibility and freedom should be given to young entrepreneurs and researchers.

Innovation often happens when one can try out several things rather than always following the general path.

Kraak: What must not be forgotten is that people as well as projects should be funded. Often one does not know the quality of the projects but does know the quality of the people. I share the opinion of Marc Gitzinger, that the seed funds from the pharmaceutical companies are still too targeted and focused. But I expect that this will improve over time, because if they continue to be too targeted, they will not find new and innovative projects.

Welten: For pharmaceutical companies, a start-up is first of all an outsourcing of risk. Biotechs are primarily "suppliers" with different interests. Some smart pharmaceutical companies allocate funds through intermediaries and not directly. This opens up the widest possible scope for biotechs. However, if investors are more monetary-driven than scientific research, it will be difficult to find sufficient funding.

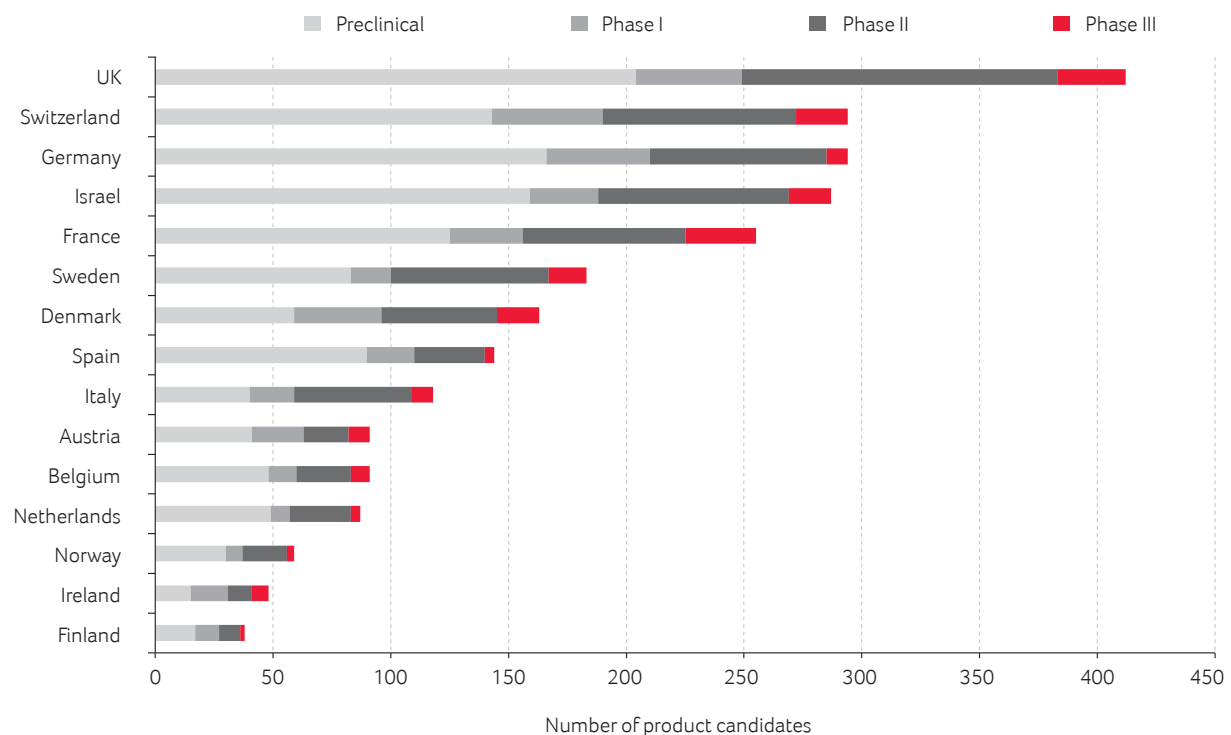
Wicki: It would be desirable to have an endowment, which funded this gap in Switzerland. In the United States, for example, these endowments build entire science camps. The question which arises for me is, how can we achieve this in Switzerland?

Welten: That's why we need seasoned analysts and professionals with a life sciences focus – people like Andreas Wicki – who are in a position to judge what is a worthwhile investment and what is not.

Wicki:

But despite all the know-how, success requires also a portion of luck.

Figure 1: European Pipeline by Country



Source: Ernst & Young and MedTRACK and company websites.

Pooler: Corporate venture funds are primarily focused on return on investment. However, the focus is not just on return, they are also seen as 'career funds' and 'talent pools'. What we must not forget is that, despite the current difficulties in the financial markets and the apparent lack of money, many projects have advanced and creative funding models that have been implemented, for instance, with patient organizations.

Welten: Exactly, and we must not forget high-net-worth individuals as they not only invest in projects but also in basic research; for example, Bertarelli and Wyss. The question is much more, 'where can one find these people and how can one approach them?' In the end, everyone is interested in fighting disease and improving health.

Gitzinger: The venture capital model is still viable for companies that are already in clinical development with a good project for which there is money. There is a clear exit where the investor makes money.

Where I do see a problem is with the spin-outs from universities. With spin-outs or spin-offs from pharmaceutical companies, there is less of a concern, because they usually have several molecules that are quite advanced and thus the financing gap is not that big. But for those companies that are still in early pre-clinical stages with new technologies, often spin-outs from universities, it is very difficult because the way to preclinical or even clinical assets is longer and thus the capital need is higher. This is where the venture model does not work very well anymore and we need to think of ways to finance this gap without losing the power of such innovative new technologies.

Welten: Speaking about the venture model. I think that another big problem here is that the required IRR (internal rate of return) of 30% by investors is way too high. The interest level is close to zero and the excess return with risk premium is 6%. If the VCs regularly were to achieve 10–12% p.a., this would be much more realistic and would also allow for more investments as the return hurdle would be lower.

Pooler: I think that, as previously mentioned, one should try to get more involvement by patient organizations, high net worth individuals, pension funds and governmental organizations to help advance these early stage projects until they are capable of regular VC funding. The difficulty, however, is that they are often not aware of these projects and have limited knowledge of the risks and rewards. Moreover, the financial crises, together with the patent cliff and the setbacks at publicly-listed biotech, has considerably reduced the number of financial specialists following the life science industry, making it even more difficult to find attractive projects. This too should not be overlooked.

Kraak: And now we come back to the corporate venture funds and their role. For instance the Novartis seed investing initiative

that shall result in a seed fund. The fund's purpose is not just return on investment – these investments are largely written off – but to fill their early stage pipeline with new innovative products.

Welten: And it is not just about approval but also reimbursement. And here the critical question must be, 'is this drug really innovative?' and 'how much do I get reimbursed from whom?'

Wicki: But this is definitely the right approach. How large are the cost savings which I achieve when I use this new and innovative product? Here a paradigm shift is taking place from a public perspective, which I fully support. All effective existing (generic) drugs should be used more widely. And innovation nowadays must have an attractive, cost-benefit ratio which benefits society. Otherwise the investor is the only one who profits and this is no longer acceptable.

The industry approach should be to create innovative products that ultimately generate added-value for all participants.

This must be incorporated early in the mindset of young entrepreneurs. Ultimately, this is about health and society as a whole. And if we now think of humanity as a whole, we have to focus on how to fund innovation and fill any gaps. For instance, an innovation tax comes to mind; say 1–2% of the net proceeds of the pharmaceutical industry. This could be pooled and controlled by the government to fund these gaps in early stage projects. Of course it is critical that the people who allocate these funds have sufficient know-how and experience.

Gitzinger: A big difference between Germany and Switzerland is that although there are ample funds for start-ups in Germany, we have seen in the past that not all initiatives were successful. Key is to get experienced people who can make a sound quality control before allocating these funds and who actively support the dynamic and brilliant scientist to also think entrepreneurially. And here I agree wholeheartedly with Andreas Wicki when he says that this is the critical issue with such initiatives.

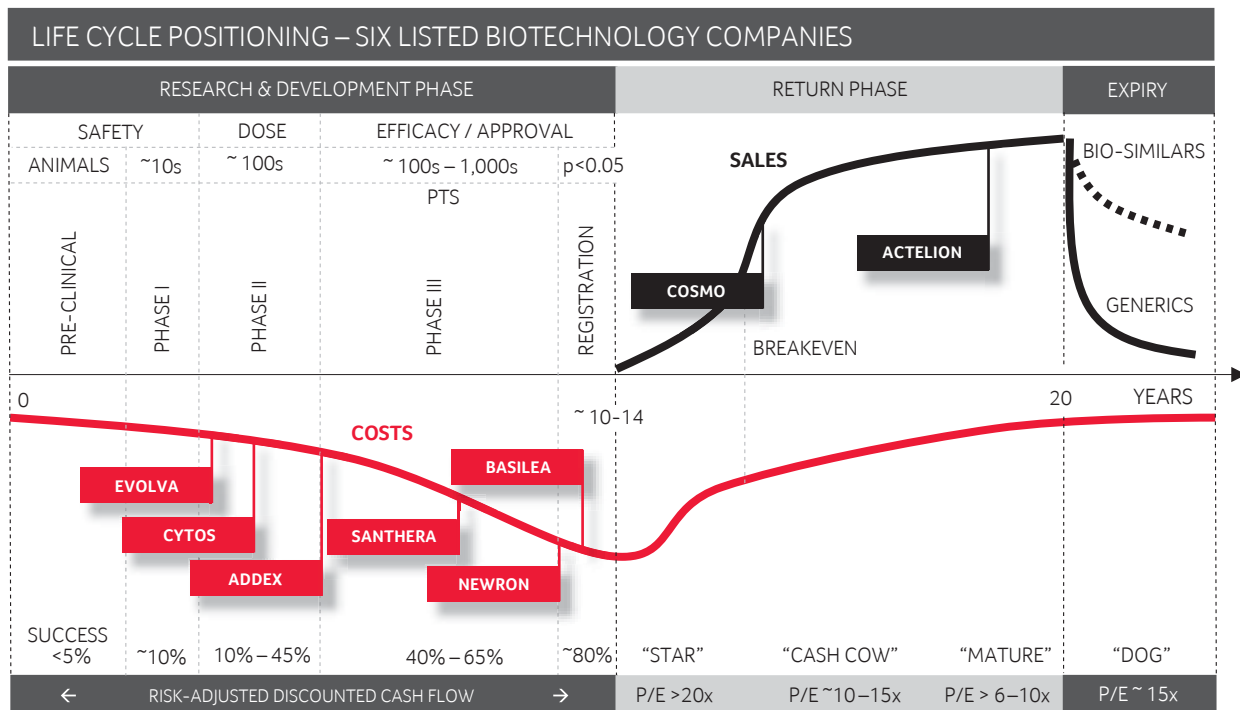
Welten: To get back to the point about whether the federal government should be involved and how. I think it is very important and crucial that the whole sector should speak with one voice and lobby in Berne. If we could orchestrate then our influence would be so much bigger. Switzerland is very federalist and broken down into regions. It is therefore extremely important to improve the concentration and focus to enhance impact not only in Berne but also among investors

Kraak: To come back to the initial question: how do we accelerate pre-clinical projects?

Wicki: Certainly, one way is the creation of centers of excellence. More and better tools are evolving and in biotech companies, there are many processes that are common to each. Every biotech has a CFO, CSO, and CMO and generally they have too much capacity for the existing projects. A new approach could be that the key resources such as CFOs are centralized within a couple of VCs. Another example is a CRO like WuXi that focuses on medicinal chemistry and works for 18 of the top 20 pharmaceuticals. Although we cannot build another WuXi in Switzerland, we are geographically relatively close together and we do have strong clusters of knowledge with good networks. And that is where we can benefit from each other!

Welten: Certain standardized processes are definitely welcome. In Switzerland, the know-how is present, there are many good entrepreneurs and there is a good exchange of information between them, but one could be more actively engaged.

Figure 2: Pharmaceutical life cycle



Source: valuationLAB

SIX Swiss Exchange – Focus on Life Sciences

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Know-how as product:
realising value

Know-how and innovation: lifeblood of high-technology markets



Anna Bozzi,
scienceindustries

The Swiss economy is highly dependent on foreign trade. Despite the ongoing financial crisis and the strong Swiss Franc, exports by the chemical, pharmaceutical and biotech industries have continued to grow. To maintain and build on what has already been accomplished, the sector needs framework conditions that empower innovation and enable sustainable growth.

Quality is one of the most important factors in the success of Swiss exports around the globe. Switzerland stands for outstanding quality, know-how and cutting-edge technologies, particularly in the chemical, pharmaceutical and biotech industries.

Given the country's limited natural resources and high wages, there were very few alternatives to remaining competitive internationally, other than specializing in high-quality and technology-intensive products. The Swiss chemical, pharmaceutical and biotech industries have embraced this strategy and made a rapid and significant progress in the development of high-value specialties. Today almost 90 % of its overall product portfolio is made up of specialties; a remarkable share when compared to the international average.

In the last decades, the increasing trend towards specialties and a continued focus on core competencies has proved a very successful strategy for companies, helping the sector withstand financial crises. The crisis in 2007-2008 greatly affected the global development of Swiss exports and negatively impacted several industry sectors. Despite this and a strong Swiss Franc, the chemical, pharmaceutical and biotech industries managed to continue growing and even increased productivity. Today with over 38 % of total Swiss exports in 2011, they make up Switzerland's largest export industry.

Swiss service exports were also affected by the global crisis. Here too scientific and technological services – licenses and patents – have recorded above average growth. In 2009, trade in technological services overtook tourism, recording 21 % of total services' exports.

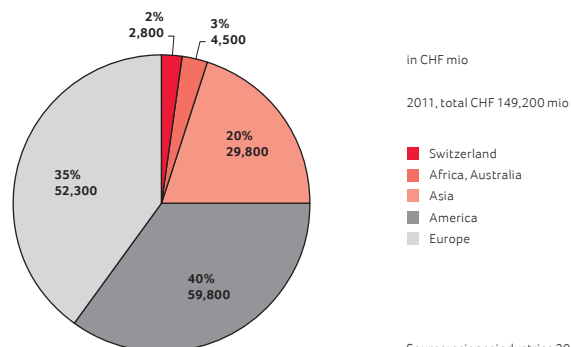
The chemical, pharmaceutical and biotech industries make a substantial contribution to the Swiss economy and thus to prosperity in Switzerland. In 2011, exports gave a considerable

boost to GDP with half of the growth in the 4th quarter coming from the sector. Of course, this level of performance can only be maintained with a national policy that creates a favorable business environment for science-based companies and promotes innovation and new technologies.

Know-how, the ability to innovate, as well as the capability to quickly respond to changes in the domestic and foreign markets, are crucial factors and have enabled the sector to become a world leader. However, success is not secured forever. Many new elements are making the economic environment increasingly challenging. These include: the persisting trend toward globalization; the unexpectedly rapid opening up of many Eastern European, South East Asian and South American markets; continuous developments in biotechnology, genetic engineering and information technology; and an ever more rapid rate of knowledge obsolescence. These trends make it imperative for firms to constantly renew their scientific and technological bases.

It is therefore vital for Swiss-based companies and for foreign companies coming to Switzerland, that they find a society which embraces innovation. These companies need a competitive framework for research, production and business; they need an attractive domestic market as a launch platform; and they require favourable trade agreements that secure access to markets worldwide. Only in this way can Switzerland maintain and possibly extend its international preeminence as an attractive location for science- and technology-based companies over the next 20 years.

Figure 1: Global turnover of the top ten member companies of scienceindustries per region



scienceindustries – The Business Association of the Industries of the Future
 scienceindustries is the Swiss business association of the chemical, pharmaceutical and biotech industry. scienceindustries supports the innovation strategies of its over 250 member companies by consistently dedicating itself to obtaining exceptional regulatory framework, nationally and internationally. For more information visit www.scienceindustries.ch.

Year in review – Swiss biotech

(selection of events in 2012)

Trigger	Company/Institution	Description
January 2012		
Collaboration Agreement	Evolva (EVE)	Evolva signed an agreement with Roquette Frères for joint research and development of biosynthetic production routes.
Positive Study Results	Okairos	Okairos' new vaccine against hepatitis C showed promising results in an early-stage clinical trial.
Collaboration Agreement	Dualsystems Biotech	Dualsystems Biotech entered into a strategic alliance with NiKem Research. The companies will jointly offer target profiling and drug discovery services.
Financing	Telormedix	Telormedix raised CHF 7.5 million from existing investors Aravis Venture and Proquest Investments.
Financing	ProteoMedix	ProteoMedix closed a CHF 2.6 million Series A equity financing round for the development of diagnostic tests in the field of prostate cancer.
Study Completion	InPheno	InPheno concluded an EU funded drug discovery project aimed at identifying nucleoside analogues active on multi-drug resistant HIV-1 strains.
Licensing Agreement	Ferring Pharmaceuticals International	SciGen Limited has signed a licensing agreement with Ferring International Center S.A. (Ferring Pharmaceuticals) and Bio-Technology General (Israel), Ltd. for the manufacture and sale of recombinant human insulin resulting in an expansion of rights.
Positive Study Results	Pevion Biotech	Pevion announced data from the clinical study of the Candida vaccine PEV7. It demonstrated the generation of specific and functional B cell memory in 100% of vaccinees.
Collaboration Agreement	Redbiotec	The German Cancer Research Institute (DKFZ) and Redbiotec extended their collaboration in the field of HPV. The parties collaborate to validate chimeric VLPs.
CTI Grant	AC Immune	University of Basel and AC Immune are to develop drugs for memory impairment in a project supported by the Commission for Technology and Innovation (CTI).
Licensing Agreement	Santhera Pharmaceuticals (SANN)	Santhera and Ipsen Renegotiate Fipamezole Licensing Agreement
Financing	Telormedix	Telormedix was elected as a member of the collaborative research programme (targeting novel mechanisms of resolution in inflammation) funded with EUR 3 million from the EU.
February 2012		
Bond Restructuring	Cytos (CYTN)	Cytos announced that the Higher Court of the Canton of Zurich approved all five resolutions of the bond restructuring. Cytos continues to look for a strategic solution.
Plant Investment	Lonza (LONN)	Lonza announced an investment into a new manufacturing concept in Visp in order to improve the development and manufacture of APIs.
Joint-venture Plans	Lonza (LONN)	Lonza confirmed to be in discussions and negotiations with the South African Government to establish a joint venture for a local manufacturing facility for Anti-Retroviral Medicines.
Study Launch	Debiopharm Group™	Curis and Debiopharm began treating non-small cell lung cancer patients in a Phase Ib clinical trial of Heat Shock Protein 90 (HSP90) inhibitor Debio 0932.
Major Share Purchase	Basilea (BSLN)/HBM	HBM increased its stake in Basilea to 20.11%. HBM mandated three members to the board of Basilea.
Collaboration Agreement	4-Antibody/Redbiotech	Redbiotec entered into a collaboration with 4-Antibody, in which Redbiotec is to apply its technology platform rePAXto an undisclosed discovery area.
Collaboration Agreement	Actelion (ATLN)	Auxilium Pharmaceuticals and Actelion entered into a partnership for the development, supply and commercialization of Xiaflex. The drug is used for the treatment of Dupuytren's contracture and Peyronie's disease.
Marketing Authorization	Gedeon Richter (PregLem)	Gedeon Richter announced that the European Commission granted marketing authorization to Esmya as pre-operative treatment of uterine fibroids.
Manufacturing Agreement	Lonza (LONN)	Lonza and Eclipse agreed on the production of the cancer antibody ET-101. The compound is to inhibit the growth of cancer stem cells.
Study Completion	Evolva (EVE)	Evolva completed its project with the US Army Research Office (ARO). EV-035 was found to be a promising antibiotic against select agents and other bacterial pathogens.

March 2012

Merger	Mondobiotec (RARE)	Mondobiotec said it planned a merger with Pierrel Research International.
Negotiation		Mondobiotec and Pierrel signed an unbinding letter of intent.
Approval	APR Applied Pharma Research	APR Applied Pharma Research and Labtec GmbH announce the European approval of Zolmitriptan Oral Dispersible Film (ODF).
Manufacturing Agreement	Bachem	Bachem and BioSpring agreed to cooperate on the manufacture of oligonucleotide-peptide conjugates involved in R&D projects.
Product Launch	Neurotune	Neurotune launched its immunoassay, NTCAF ELISA, for sarcopenia (debilitating muscle disorder).
CTI Grant	Telormedix	Telormedix and SUPSI receive funding from CTI/KTI for a research collaboration on molecular modeling of drug-target interactions.
Financing	HBM Partners	Life Sciences specialist HBM Partners has raised €90m in the first close of its HBM BioCapital II fund, which will invest in revenue-generating companies.
Manufacturing Agreement	Lonza (LONN)	Lonza signed an agreement to produce an antibody for South Korean firm LegoChem Biosciences.
Positive Study Results	Pevion Biotech	Pevion announced results from a survey of recurrent vulvovaginal candidiasis (RVVC) patients.
Marketing Authorization	APR Applied Pharma Research	APR and Labtec announce to have received the marketing authorization through a decentralized procedure (DCP) in 15 European countries of Zolmitriptan ODF.
Positive Study Results	Basilea (BSLN)	Basilea's phase III HANDEL study with oral alitretinoin in severe chronic hand eczema met the study endpoints.
Research Agreement	Dualsystems Biotech	Dualsystems and Sanofi entered into a drug profiling agreement. Dualsystems is to identify molecular targets for Sanofi's oncology discovery pipeline.
Bond Restructuring	Cytos (CYTN)	Cytos announced that the convertible bond restructuring approved by Higher Court of the Canton of Zurich became valid and binding.
Study Launch	Okairos	Okairos announced the initiation of a Phase I/II clinical trial evaluating its vaccine against the hepatitis C virus (HCV).
Drug Approval	Effrx Pharmaceuticals	EffRx Pharmaceuticals SA today announced that the FDA has approved BINOSTO® Effervescent Tablets.
CTI Grant	Numab	Numab announces the approval of a research grant from the Swiss Commission for Technology and Innovation (CTI).
Service Agreement	InPheno	InPheno was selected as preferred service provider for a Drug Discovery Program of a Russian drug development company.
License Agreement	Kuros	Synthes and Kuros Biosurgery signed a license and development agreement to commercialize Kuros' synthetic matrix technology in certain fields.
Plant Investment	Cerbios	Cerbios to receive the Certificate of the Swiss Private Sector Energy Agency
Firm Name Change	Addex Therapeutics (ADXN)	Addex Pharmaceuticals changed its name to Addex Therapeutics to reflect more closely the company's focus on oral small molecule-based therapeutics.
Financing	Cytos (CYTN)	Cytos announced that it has signed agreements with strategic investors to raise a total of up to CHF 37 million (USD 40 million) in equity and debt.
Approval	Syngenta (SYNN)	Syngenta receives approval for quadruple stack corn in Argentina
Positive Study Results	Addex Therapeutics (ADXN)	Addex announced positive top line data from a Phase IIa clinical study of dipraglurant in Parkinson's disease (PD) patients.
Collaboration Agreement	Dualsystems Biotech	Dow AgroSciences LLC and Dualsystems Biotech announced a drug profiling agreement.
License Agreement	Genedata	Chugai Pharmaceutical extended the multi-year licensing of Genedata Expressionist software.
Company Founding/Financing	ADC Therapeutics	Celtic Therapeutics Management announced the launch of ADC Therapeutics with a pipeline of ten proprietary ADC oncology development programs and an initial budget of USD 50million.

April 2012

Pipeline Update	Actelion (ATLN)	Actelion announced to re-direct its development efforts in the anti-inflammatory area, focusing on a CRTH2 antagonist currently in Phase I clinical development.
Drug Approval	Actelion (ATLN)	Actelion received the Japanese approval for miglustat for the treatment of Niemann-Pick type C disease, an orphan disease.
Positive Study Results	Basilea (BSLN)	Basilea presented new research data on a biomarker for BAL101553 at the AACR. The compound is a small molecule that arrests tumor cell proliferation.
Swiss Takeover Board Approval	Cytos (CYTN)	The Swiss Takeover Board granted to the investors an exemption from the obligation to make a public offer in case they exceed the threshold of 33 1/3 percent.
Positive Study Results	Molecular Partners	Molecular Partners announced that its anti-VEGF DARPIn for ocular indications - developed in partnership with Allergan - completed phase IIa development.

CTI Grant	Nano Bridging Molecules	NBMolecules®, the University of Zurich and the ETH Zurich are to develop a novel multi-phosphonated surface treatment of orthopaedic implants in a project supported by the Commission for Technology and Innovation (CTI).
Collaboration Agreement	Santhera Pharmaceuticals (SANN)	Santhera announced its participation in the EndoStem co-funded by the European Union to accelerate the development of effective therapies for muscular dystrophies.
Manufacturing Agreement	Lonza (LONN)	Lonza signed a deal with Agennix for the production of the cell lung cancer product talactoferrin. Lonza will produce commercial material.
Restructuring	Addex Therapeutics (ADXN)	Addex Therapeutics announced to reduce the size of its operations in Geneva to improve operational efficiency. The headcount is expected to be reduced by up to 28 people.
Positive Study Results	Addex Therapeutics (ADXN)	Addex Therapeutics announced positive data from studies of its lead GABA-B receptor in preclinical models of overactive bladder (OAB).
Licensing Agreement	EffRx Pharmaceuticals	EffRx Pharmaceuticals SA and Mission Pharmacal have entered into a patent and technology licensing agreement for the manufacturing and commercialization of BINOSTOTM Effervescent Tablets in the United States and Canada.
Merger Negotiation	Mondobiotec (RARE)	Mondobiotec and Pierrel agreed to stop their discussions on a possible business combination, as expressed in the Letter of Intent signed in March, 2012.
Restructuring	Merck Serono	Merck Serono announced the plans to close its headquarters in Geneva. Biotech production in Aubonne and Corsier-sur-Vevey is to continue.
Entrepreneur Partnership Program (EPP)	Merck Serono	The EPP is part of a EUR 30 million commitment to support the creation of spin-off and start-up companies that originated at Merck Serono.
Positive Study Results	Actelion (ATLN)	Actelion's macitentan meets primary endpoint in the Phase III SERAPHIN study in patients with pulmonary arterial hypertension.
May 2012		
Collaboration Agreement	Evolva (EVE)	Evolva expanded its collaboration with IFF to implement biosynthetic routes for the production of flavouring ingredients.
Collaboration Agreement	4-Antibody	4-Antibody and Evotec signed a collaboration agreement for antibody discovery and development services.
Orphan Drug Designation	Kenta Biotech	The European Commission granted 'Orphan Drug' status to Kenta's KBSA301. The compound is used for the treatment of pneumonia.
Licensing Agreement	Basilea (BSLN)	Dotmatics, Ltd. has signed a license agreement with Basilea under which it has licensed and globally deployed its entire suite of scientific informatics solutions to Basilea for pre-clinical research data management.
Financing	Cytos (CYTN)	Cytos raised an additional CHF 3.2 million via rights offering to existing shareholders. 63.9% of the subscription rights were exercised resulting in 1'709'700 new shares.
Licensing Agreement	Debiopharm Group™	Debiopharm has signed an exclusive agreement with Vifor Pharma for the distribution and commercialization of the 1-, 3- and 6-month formulations of Pamorelin(R) LA and of the three-month formulation of Salvacyl(R) in Switzerland.
Collaboration Agreement	Neurotune	ALS Therapy Development Institute entered into a collaboration with Neurotune to investigate a potential treatment for ALS.
Licensing Agreement	Baliopharm	Baliopharm has signed an agreement with ApoGbR under which Baliopharm obtains exclusive worldwide license rights to develop bi-specific antibody called Novotarg.
Positive Study Results	SLA Pharma AG	S.L.A. Pharma AG has announced clinically and statistically significant top-line data from their Phase II double blind randomised placebo controlled study.
Collaboration Agreement	Selexis	Adienne Pharma & Biotech entered into a service agreement with Selexis. Selexis is to develop a manufacturing cell line for one of Adienne's orphan drugs.
Financing	Cytos (CYTN)	Cytos completed a CHF 23.75 million equity investment which is part of the planned CHF 37 million financing announced in March, 2012.
Collaboration Agreement	Debiopharm Group™	Debiopharm and Vifor Pharma signed a distribution and commercialization agreement for Pamorelin in Switzerland.
Study Launch	AC Immune	AC Immune's crenezumab will be tested on individuals who are destined to develop Alzheimer. The study is run by the US National Institutes of Health, the Banner Alzheimer's Institute, the University of Antioquia in Colombia and Genentech.
Manufacturing Agreement	Lonza (LONN)	Avalanche Biotechnologies and Lonza started a manufacturing collaboration on adeno-associated viral (AAV) vectors for gene therapy in various therapeutic areas.
Licensing Agreement	Genedata	Genedata and Roche extended their collaboration of biomarker discovery for personalized healthcare.
Collaboration Agreement	Selexis	ADIENNE Pharma & Biotech has entered into a Service Agreement with Selexis for the development of a manufacturing cell line for an orphan drug.

Collaboration Agreement	Selexis	Selexis entered into a partnership with Fusion Antibodies Services. The companies will link monoclonal antibody programs with the generation of CHO cell lines.
Site Relocation	Kenta Biotech	Kenta Biotech announced that it relocated from Bern to Bio-Technopark in Zurich-Schlieren.
Collaboration Agreement	Biocartis	Biocartis announced a collaboration with Wellcome Trust Sanger Institute and Philips Research to develop a workflow for the extraction and amplification of tumor DNA.
Public-private Collaboration	Basilea (BSLN)	Basilea participated in public-private collaboration to tackle antibiotic resistance. The Innovative Medicines Initiative is to fund EUR 109 million and GSK, AZ, SA, J&J and Basilea an additional EUR 114.7 million to work jointly.
June 2012		
Financing	Telormedix	Telormedix and Foamix received EUR 0.95 million in funding from the European Eurostars Programme to develop a new skin cancer topical treatment.
Study Launch	Addex Therapeutics (ADXN)	Addex Therapeutics and Janssen Pharmaceuticals initiated a Phase 2 study of ADX71149 in adults with major depressive disorders.
Study Results	Debiopharm Group™	Debiopharm presented results of a Phase I open-label dose-escalation study with Debio 0932, an oral Heat Shock Protein 90 (HSP90) inhibitor.
Collaboration Agreement	Basilea (BSLN)	Basilea entered into global agreement with Stiefel (GSK) where Stiefel gains exclusive worldwide rights for Toctino. Basilea receives GBP 146 million upfront payment and is eligible for additional milestones of up to GBP 50 million.
Financing	EVA	The Basler Kantonalbank and the Basellandschaftliche Kantonalbank increased their stake in EVA (ErfindungsVerwertung AG). EVA provides seed financing to Life Sciences start-up companies.
Collaboration Agreement	Polyphor	Polyphor signed a research collaboration and license agreement with Boehringer Ingelheim. Polyphor will apply its MacroFinder drug discovery technology and is to receive up-front and milestones payments as well as royalties.
Positive Study Results	Kuros	Kuros Biosurgery announced that KUR-023 successfully sealed intra-operative CSF leakage in all evaluable patients demonstrating safety and effectiveness.
Manufacturing Agreement	Lonza (LONN)	Five Prime Therapeutics entered into an agreements with BioWa and Lonza for the R&D and production of oncology drugs.
Positive Study Results	Anergis	Anergis reached several preclinical milestones with AllerR, a vaccines against pollen. The company also received positive feedback from the FDA for AllerR.
Collaboration Agreement	Cerbios-Pharma	Lipidor and Cerbios-Pharma have signed an agreement to jointly develop dermatological products built on Lipidor's novel formulation technology.
Manufacturing Plant Completion	Lonza	Lonza announced the completion of a new GMP clean room within its Houston operations. The clean room supports viral vector and viral vaccine projects.
Collaboration Agreement	AC Immune	AC Immune and Genentech (Roche) entered into a collaboration for Alzheimer's disease. The license agreement is worth more than CHF 400 million.
License Agreement	Debiopharm Group™	Debiopharm licensed from Ascepcion Pharmaceuticals the global commercialisation rights to ASP-08126 which binds to several tyrosine kinase (TK) oncogenes.
Collaboration Agreement	Debiopharm Group™	Debiopharm, Immunexpress and Biocartis partnered in a license for the commercialization of SeptiCyte Triage.
Financing	Debiopharm Group™	Debiopharm announced to support the Swiss pre-seed fund venture kick. The fund contributes to the development of high potential business ideas at Switzerland's universities.
Positive Study Results	Addex Therapeutics (ADXN)	Addex announced positive data from a recently completed Phase 2a study with dipraglurant in Parkinson's disease patients with levodopa-induced dyskinesia.
Milestone Payment	Evolva (EVE)	Evolva achieved the first milestone in their collaboration with IFF. As the first major target in this project was achieved, IFF will make a payment to Evolva.
Award	ProteoMediX	ProteoMediX was awarded the prize of the Foundation W. A. de Vigier. The award is an acknowledgement for the ProteoMediX' technology.
Study Completion	Genkyotex	Genkyotex announced the successful completion of a Phase Ia study with GKT137831, a first in class inhibitor targeting NOX1 and NOX4 enzymes.
Corporate Structure Simplification	Mondobiotech (RARE)	Mondobiotech AG absorbed its two Swiss sister companies Mondobiotech Europe AG and Fast-Take-off AG. The transaction did not lead to a capital increase.
Share Purchase Agreement	Mondobiotech (RARE)	Mondobiotech agreed to purchase from BioPharma Invest AG up to 30'000'000 ordinary shares in Mondobiotech at a symbolic price.
Licensing Agreement	OncoEthix	Mitsubishi Tanabe Pharma Corporation had successfully completed Phase 1 clinical studies in healthy volunteers and licensed the compound to OncoEthix.

July 2012

Positive Study Results	Auris Medical	Key results from Auris Medical's phase IIb study with AM-101, a novel intratympanic (i.t.) treatment for acute inner ear tinnitus, were presented.
Licensing Agreement	Ferring Pharmaceuticals International	Ferring has signed a license agreement with Albireo AB under which, Ferring has acquired rights to develop and commercialize Elobixibat from Albireo.
Minority Stake Purchase	Debiopharm Group™	Debiopharm invested in Tweasy SA, a provider for e-marketing platforms for SMEs.
Plant Investment	Syngenta (SYNN)	Syngenta today announced a \$50 million investment to build a new processing plant for corn and sunflower seeds in Argentina.
Collaboration Agreement	ADC Therapeutics	ADC Therapeutics and the U.K.'s Cancer Research Technology agreed to develop antibody-drug conjugates.
Financing	GenKyoTex	GenKyoTex extended its Series C round by CHF 25 million to fund the lead compound GKT137831 through Phase II to combat diabetes.
Licensing Agreement	Genedata	Takeda Pharmaceutical expanded the use of Genedata Expressionist by adding solutions for sequencing data analysis.
Restructuring	Actelion	Actelion announced a cost saving initiative that is to be implemented by the end of 2012. The initiative could result in a reduction of up to 135 positions.
Patent Approval	Mondobiotec (RARE)	Mondobiotec medicinal product candidate DasKloster 0039 granted patent for treatment of Hepatitis B virus infection by the US Patent Office
Positive Study Results	Addex Therapeutics	Addex announced positive data of mGluR4 in Parkinson's disease.
Financing	Mondobiotec (RARE)	Mondobiotec signed an investment agreement with The Global Emerging Markets Group (GEM).
Collaboration Agreement	Redbiotec	Redbiotec closed a collaboration agreement with an undisclosed company in the field of antibody generation.
Company Founding/Financing	Merck Serono/Prexton Therapeutics	Merck Serono announced the creation of Prexton Therapeutics. The new company will be active in the field of Parkinson's disease.

August 2012

License Agreement	Lonza (LONN)	Lonza entered into a worldwide licensing agreement with iPS Academia Japan for a pluripotent stem cell patent portfolio.
Positive Study Results	Kuros Biosurgery	Kuros Biosurgery AG announced that KUR-023 successfully sealed intra-operative CSF leakage in all evaluable patients.
Study Launch	Debiopharm Group™	Curis and Debiopharm initiated the Phase I-II clinical study of Debio 0932. The study is to test the compound in patients with advanced cell lung cancer.
Orphan Drug Designation	Mondobiotec (RARE)	Das Kloster 1001 received a FDA orphan drug designation for the treatment of idiopathic pulmonary fibrosis.
Licensing Agreement	Rhizen Pharmaceuticals	Rhizen and TG Therapeutics announced a Joint Venture Collaboration for global development and commercialization of Rhizen's Novel Selective PI3K Kinase Inhibitors.
Collaboration Agreement	Molecular Partners	Molecular Partners and Allergan entered into two R&D and commercialization agreements for DARPin products in ophthalmology.
Collaboration Agreement	Redbiotec	Redbiotec closed an agreement with a listed, leading biopharmaceutical company in the field of cancer therapeutics.
Collaboration Agreement	Redbiotec	Redbiotec started a project with Merck Sharp & Dohme Corp. in which Redbiotec applied its technology platform rePAX to an undisclosed discovery area.
Study Launch	Debiopharm Group™	Debiopharm announces first patient enrolled in Phase III Study for the rare disease Central Precocious Puberty.

September 2012

Financing	Lonza (LONN)	Lonza issued a dual tranche CHF 305 million straight bonds with maturities of 6 years and 10 years and annual coupons of 2% and 3%.
Licensing Agreement	Helsinn Group	Helsinn announced that it has entered into an exclusive agreement with DARA BioSciences, Inc. (Nasdaq: DARA) for U.S. commercial rights to Gelclair®.
Association Foundation	Merck Serono	Merck Serono employees founded an association for the maintenance of their working locations in the Geneva region.
Collaboration Agreement	Genedata	Genedata extended its research informatics collaboration with UCB.
Asset buyout	Ferring Pharmaceuticals International	Ferring International Center agreed to acquire the assets of Al-Kindi Pharmaceutical Industries PLC for JOD 4 mil (USD 5.658 mil).
Study Launch	Addex Therapeutics (ADXN)	Addex announced that Janssen Research & Development has dosed the first patient in a multicenter, double-blind, Phase 2 study of ADX71149.

Study Launch	GeNeuro	GeNeuro launched a phase IIa clinical study with GNBAC1, an antibody for use in multiple sclerosis patients.
Financing	Lonza (LONN)	Lonza placed a dual currency multi-tranche bond with the equivalent of EUR 170 million. The private placement has maturities of three, five and seven years.
Firm Recognition	AC Immune	FierceBiotech selected AC Immune for its 2012 Fierce 15 list designating it as one of the most promising private biotechnology companies in the industry.
System Integration	Genedata	Genedata and Insilico Biotechnology announced the integration of their technologies.
Firm Recognition	Okairos	FierceBiotech named Okairos as one of 2012's Fierce 15 companies.
Patent Approval	Cardiolynx	Cardiolynx announced that the European Patent Office (EPO) has granted a patent covering a new chemical entity, CLC-1280.
Positive Study Results	Addex Therapeutics (ADXN)	Addex Therapeutics announced the positive Proof of Concept for the receptor mGluR4 for multiple sclerosis.
Milestone Payment	Evolva (EVE)	Evolva achieved the first milestone in their collaboration with Roquette Frères SA. Roquette will make a milestone payment to Evolva.
Award	ProteoMediX	ProteoMediX was been awarded the Life Sciences Prize 2012. The prize of CHF 10'000 is under the patronage of the Swiss Biotech Association and BioValley Basel.
Facility Inauguration	Octapharma	Octapharma opened a EUR 25 million research facility for recombinant protein drug development in Heidelberg, Germany.
Manufacturing Agreement	Lonza (LONN)	Lonza received a contract from Intellect Neurosciences to develop and manufacture the antibody Conjumab with potential applications for Alzheimer's disease.
October 2012		
Manufacturing Agreement	Lonza (LONN)	Lonza and Celladon Corporation entered into a process transfer and GMP manufacturing agreement.
Collaboration Agreement	CARBOGEN AMCIS	CARBOGEN AMCIS announced a formal collaboration with ADC Biotechnology for the development and production of antibody drug conjugates (ADCs).
CTI Grant	Addex Therapeutics (ADXN)	Addex and collaborators from UNIL and EPFL were awarded a Swiss CTI grant to develop allosteric modulators for neurodegenerative and psychiatric diseases.
Company Founding/Financing	Merck Serono/ Asceneuron	Merck Serono founded Asceneuron and invested EUR 5 million in the spin-off.
Marketing Authorization Application	Basilea (BSLN)	Basilea received confirmation from European health authorities for the antibiotic ceftobiprole. The compound was accepted for review under the decentralized procedure.
Milestone Payment	4-Antibody	4-Antibody announced two additional milestone payments from Human Genome Sciences.
Financing	Addex Therapeutics (ADXN)	Addex Therapeutics raised USD 10.3 million in a private placement to international institutional investors.
Licensing Agreement	Helsinn	Specialised Therapeutics Australia reached an agreement with Helsinn to in-license the ghrelin receptor agonist anamorelin for Australia and New Zealand.
Financing	NovImmune	The European Commission awarded a grant of EUR 6 million to the 'FIGHT HLH' consortium lead by NovImmune.
Acquisition	Debiopharm Group™	Debiopharm acquired a minority stake in Searchbox SA, a semantic search engine company for professionals.
Collaboration Agreement	Covagen	Covagen entered into a research and license agreement with Mitsubishi Tanabe Pharma.
Manufacturing Agreement	Lonza (LONN)	Lonza and OncoMed Pharmaceuticals signed a manufacturing collaboration and license agreement for several anti-cancer therapeutics.
Positive Study Results	Addex Therapeutics (ADXN)	Addex Therapeutics announced positive preclinical data for its GABA-B receptor (ADX71441) in alcohol binge drinking.
Collaboration Agreement	BioXpress Therapeutics SA	BioXpress Therapeutics has signed an agreement with AET BioTechnology, Ltd. for the co-development of a biosimilar version of the TNF inhibitor MAb Adalimumab.
Positive Study Results	AmVac	AmVac reported preclinical data for AMV 602, a vaccine for the prevention of respiratory conditions (such as bronchiolitis and pneumonia).
Restructuring	Lonza (LONN)	Lonza is to cut 400 jobs in Visp and another 100 management positions globally.
Positive Study Results	Genkyotex	Genkyotex announced that Phase I studies have demonstrated excellent safety and tolerability following single and multiple oral doses of GKT137831.

November 2012

Positive Study Results	Addex Therapeutics (ADXN)	Addex announced positive data from the Phase 2a clinical study of ADX71149 in schizophrenia.
Study Launch	Anergis	Anergis started to treat the first patient in a Phase IIb clinical trial. The trial is to evaluate the efficacy and tolerability of a 5-injection/2-months treatment with AllerT.
Award	ProteoMediX	ProteoMediX was awarded the Swiss Technology Award 2012 in the category "Start-up".
Program Launch	Pevion Biotech	Pevion launched a new program called Defensomes, a platform for immune enhancement via mechanisms of innate immunity.
Collaboration Agreement	Molecular Partners	Molecular Partners entered into a collaboration agreement with Boehringer Ingelheim.
Award	AC Immune	FierceBiotech selected the "10 Top Women in Biotech" for their innovation in life sciences. Andrea Pfeifer was honoured through her personal qualities along with the successful development of the thriving biotech company.
Collaboration Agreement	Helsinn	Helsinn signed an agreement with the Conquer Cancer Foundation of the American Society of Clinical Oncology.
Positive Study Results	Auris Medical	Auris Medical reported positive results from phase IIb trial with AM-111 for the treatment of acute sensorineural hearing loss.
Product Launch	Prionics	Prionics started marketing a new test to detect TSE (Transmissible Spongiform Encephalopathies; scrapie and mad cow disease) in sheep and goats.
Award	BioVersys	BioVersys won the young entrepreneur Nordwestschweiz award from the Swiss Venture Club. The company competed against 41 companies.
Study Launch	Basilea (BSLN)	Basilea initiated the phase 1 study in its clinical development program for BAL30072.
Acquisition	Evolve Holding (EVE)	Evolve announced it has entered an agreement to acquire certain assets owned by Fluxome Sciences A/S, a Danish private company that is in reconstruction.
Award	Addex Therapeutics (ADXN)	Addex with its lead program dipraglurant was named as one of the top 10 neuroscience projects to watch by Windhover and Virginia Herndon.
Plant Divestiture	Lonza (LONN)	Lonza sold the Brandenburg KY Performance Urethanes and Organics business to Monument Chemical.

December 2012

Collaboration Agreement	Redbiotec	Intercell and Redbiotec completed the proof of concept study, in which Redbiotec applied its technology platform rePAX in an undisclosed discovery area.
Collaboration Agreement	Redbiotec	Redbiotec signed an agreement with Roche Diagnostics. Roche is to apply the technology platform rePAX to produce VLPs.
Product Launch	Debiopharm Group™	Debiopharm announced that Dr. Reddy's launched Pamorelin in India. The drug is applied for the treatment of metastatic prostate cancer.
Financing	Biocartis	Biocartis completed a EUR 34.5 million Series D equity fund raising entirely backed by existing investors.
Acquisition	Spirig Pharma	Galderma Pharma and Spirig announced that they have entered into a definitive agreement under which Galderma will acquire Spirigmore
Marketing Authorization Application	Actelion (ATLN)	Actelion announced the acceptance of the New Drug Application for macitentan by the FDA.
Positive Study Results	Actelion (ATLN)	Ponesimod was successful in mid-stage trial in patients with moderate to severe chronic plaque psoriasis.
Collaboration Agreement	GlycoVaxyn	GlycoVaxyn announced a collaboration with GSK Biologicals to develop new bacterial vaccines employing GlycoVaxyn's bio-conjugation technology.
Clinical Development	Actelion (ATLN)	Cadazolid moved into Phase III clinical development in patients suffering from Clostridium difficile associated diarrhea.

Disclaimer:

This information was compiled on the basis of publicly available information only. We therefore cannot guarantee that all events are included in the above summary for 2012.

Swiss biotech in review



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The Swiss biotech sector experienced a wave of mixed emotions in 2012. Good news about clinical developments was counter-balanced by various announcements concerning restructuring and even closures.

Revenues – defying global headwinds

The industry achieved total revenues of more than CHF 4.6 billion compared to CHF 4.7 billion in 2011*.

This is a notable result considering the ongoing keen economic conditions around the globe, including the latest impact of the European debt crisis, ongoing pressure on healthcare costs, and the strong Swiss franc.

Fund raising becomes ever more difficult

Financing continued to be tough for the Swiss biotech sector. The amount of capital raised was approximately CHF 260 million, whereof a substantial amount was collected by Cytos Biotechnology during its restructuring exercise. Large private rounds of investment were achieved by ADC Therapeutics (CHF 45 million), Biocartis again (CHF 41.4 million) and Genkyotex (CHF 25 million). The financing cycle again mirrored 2012, albeit showing significantly lower investments than in the previous year. However this is not a new phenomenon for the Swiss biotech industry. Taking last year's debt financing out of the analysis, the overall picture looks similar to previous years. In addition, the financing gap could partly be compensated by smart deal arrangements (for more details see below).

Public markets/products/clinical development

MerckSerono's announcement of the closure of the Geneva headquarters of its biotechnology division, and the associated reduction of the workforce by several hundred employees was a big shock for the Swiss biotechnology sector. To soften the impact of the closure, MerckSerono initiated an Entrepreneur Partnership Program which has so far led to the foundation of

two therapeutics spin-outs as well as three spin-outs offering biomarker and IT services. Furthermore, the launch of a Geneva biotech center is underway.

Actelion and Lonza, two more SIX-listed companies, also announced cost-saving programs with a negative impact on the workforce in Switzerland. Against this, several listed companies (Actelion, Addex, Basilea) as well as some private companies (AmVac, Anergis, Auris, Molecular Partners, Okairos, Pevion and Selexis) were able to announce positive clinical study results or even filings for marketing authorization applications in Europe and the U.S.

Deals – Mergers & acquisitions again a key driver for business development and growth

Several Swiss biotechs were able to enter into attractive collaboration arrangements with international partners. These further fostered their product development and enabled them to access new funds. Selective examples of such collaborations are: Evolva with Roquette Frères SA and IFF, GlycoVaxyn with GlaxoSmithKline (GSK), 4-Antibody with Evotec, Polyphor with Boehringer Ingelheim, AC Immune with Genentech/Roche as well as Molecular Partners with Allergan. The AC Immune/Genentech deal volume is up to more than CHF 400 million and the Molecular Partners/Allergan deal included an upfront payment of USD 62.5 million and milestone payments up to USD 1.4 billion.

Basilea entered into a global agreement with Stiefel (GSK) to sell its worldwide rights for Toctino. Upon the successful closing of this deal, Basilea qualified for an upfront payment of CHF 225 million with the prospect of additional milestone payments up to CHF 33 million.

Further remarkable transactions and events for Swiss biotech companies in 2012 are included in our *Year in Review* summary, presented on pages 21 to 27 in this report.

Promises for the future

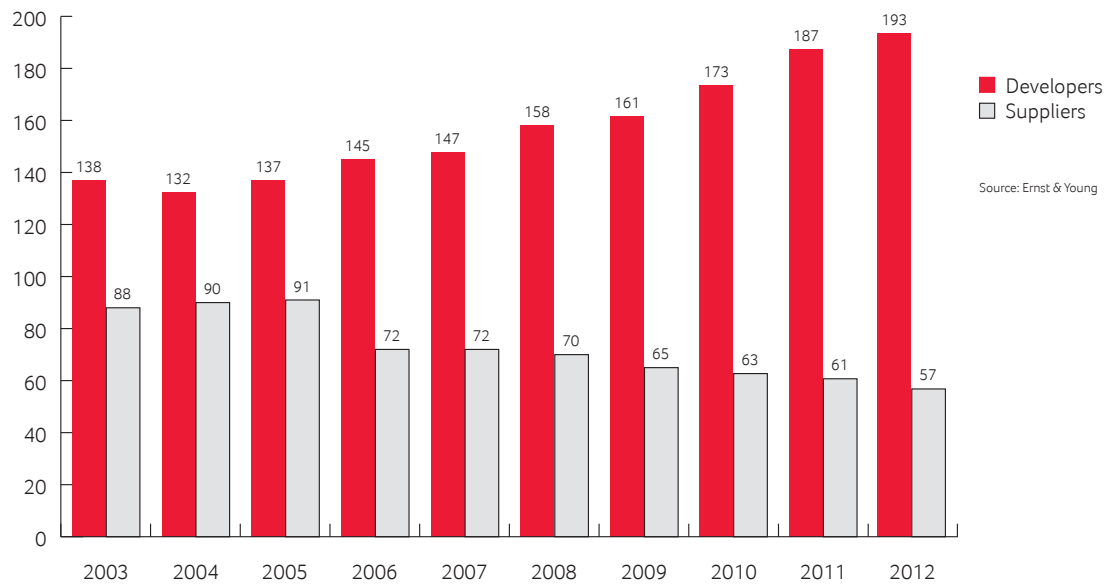
Reflecting on the various initiatives supported by the Swiss National Science Foundation (SNSF) and the Commission for Technology and Innovation (CTI), it is worth noting that some Swiss companies were awarded both national and international prizes. ProteoMediX and Virometix were awarded a prize by the Foundation W.A. de Vigier, and ProteoMediX won the Life Sciences BioValley prize as well as the Swiss Technology award in the start-up category. BioVersys won the Young Entrepreneur Award Nordwestschweiz of the Swiss Venture Club. And AC Immune CEO, Prof. Andrea Pfeifer, was selected by Fierce Biotech as one of the '10 Top Women in Biotech'.

About Ernst & Young

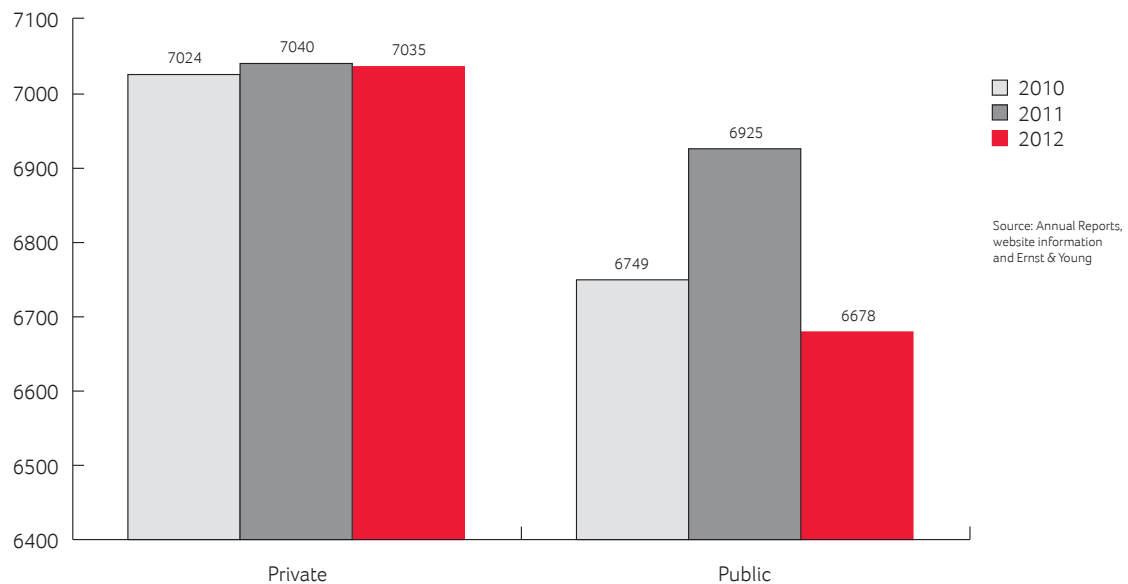
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Facts & figures

Number of biotech companies in Switzerland



Number of employees

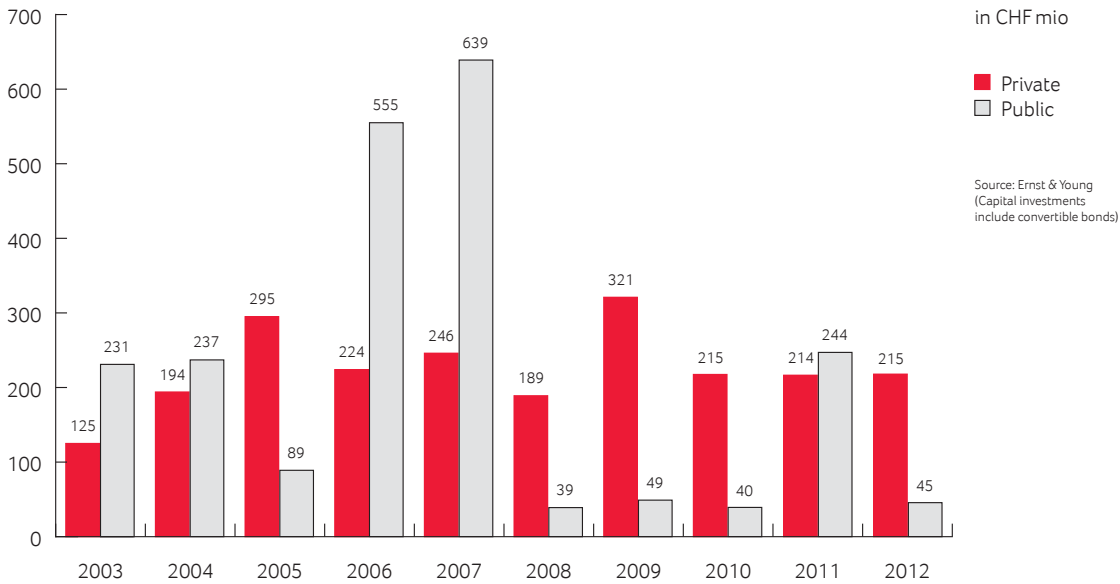


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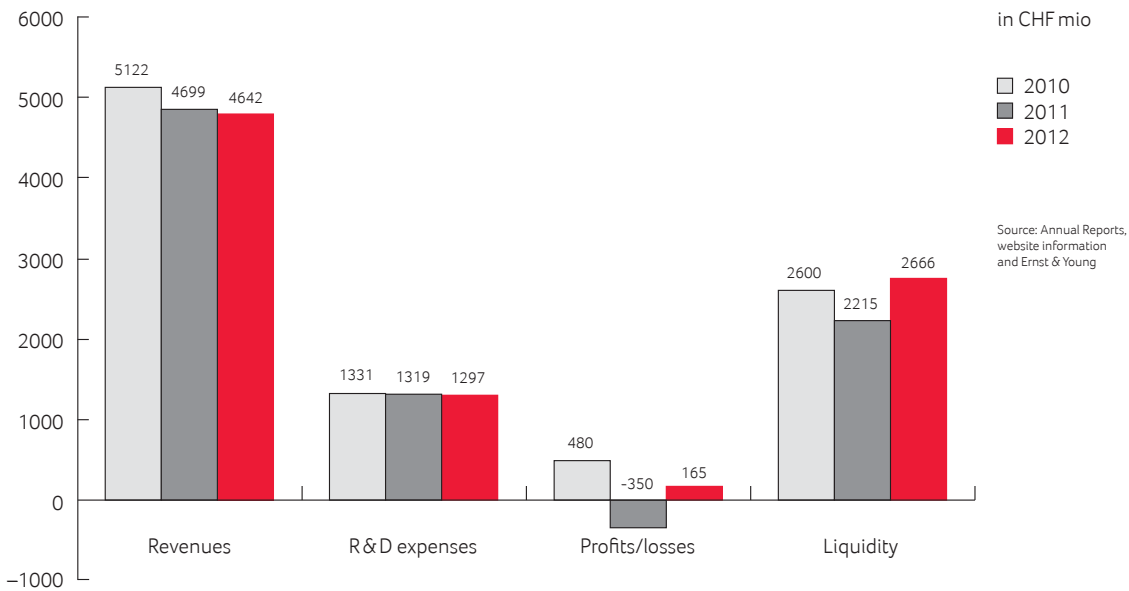
* Up until the 2012 Swiss Biotech Report, revenues, R&D expenses and employees of Merck Serono's Swiss operations (a division of Merck Germany) had been included based on actual figures publicly available or careful estimates. Due to the discontinuation of their operations in Switzerland, the company is now excluded and prior year figures have been restated accordingly.

- The 2012 data in this table is based on information that has become available until early March 2013 when this report was compiled. At this time, some of the companies had not yet disclosed their final financial figures for 2012. Therefore, some figures were carefully extrapolated on the basis of latest interim data publicly available (e.g. Q3 2012).

Capital investment in Swiss biotech companies



Total Swiss biotech companies

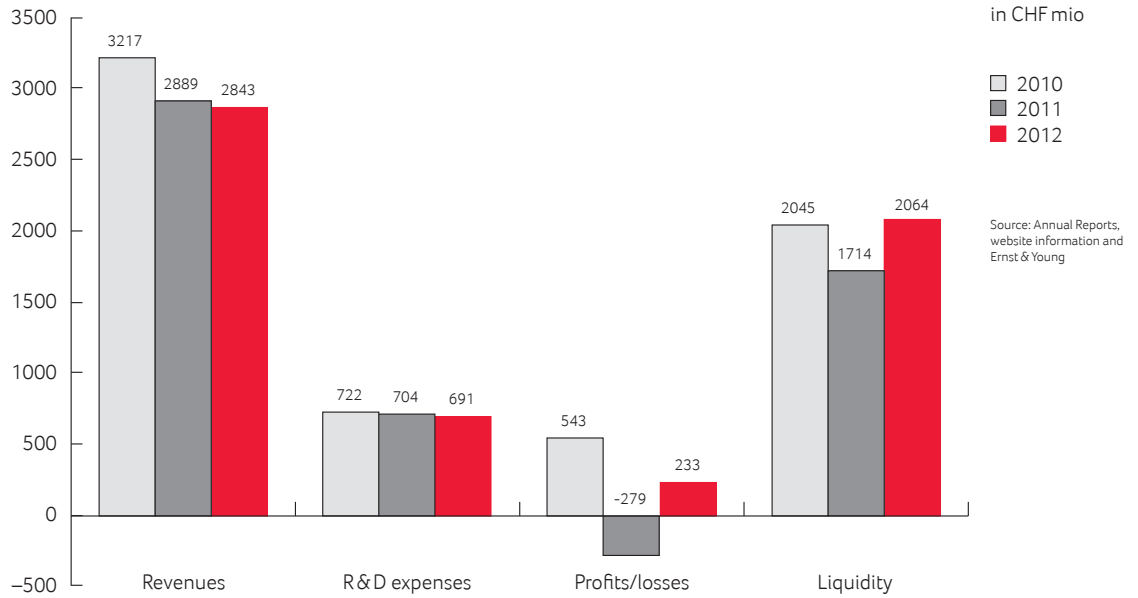


– Financial figures of Lonza’s business segments “Bioscience” and “Biological Manufacturing” are included for all years presented based on actual figures publicly available or careful estimates. Lonza’s Bioscience and Biological Manufacturing business sectors are presented due to Lonza’s transformation into a life sciences company and its inclusion into the ICB Biotech Sector and the SXI LIFE SCIENCE® and SXI Bio+Medtech® indices at the SIX Swiss Exchange.

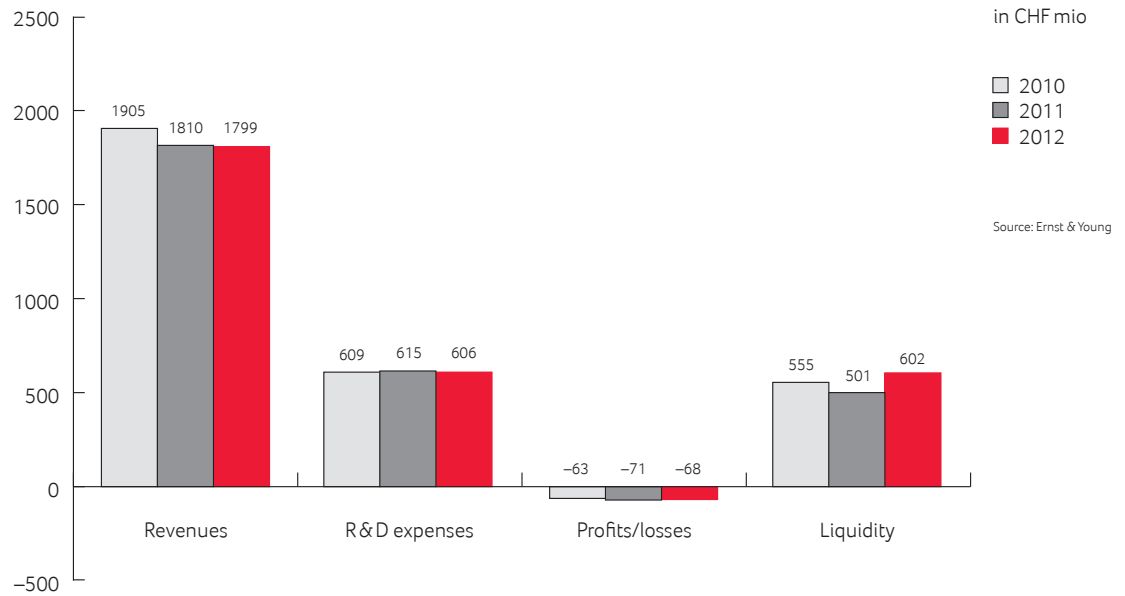
– As some private companies do not disclose financial figures, the figures above represent Ernst & Young’s best estimate.

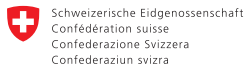
– All figures are headquarter-counted.

Public Swiss biotech companies



Private Swiss biotech companies





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