EMGEN Newsletter

Vol. 6, Issue 11

IN THIS ISSUE:

Eastern Mediterranean Health Genomics and Biotechnology Network (EMGEN) was created in 2004 with collaboration of representatives of selected centers of excellence in (health related) molecular biology, biotechnology & genomics in the Eastern Mediterranean region by recommendations and efforts of WHO/EMRO. Sponsored by Iran Biotechnology Development Council.

Address:
Biotechnology building, #69, Pasteur Ave., Pasteur Institute of Iran
Tehran, Iran, 13164
Tel: +98-21-66954324
Fax: +98-21-66465132
E-mail: emhgbn@gmail.com, emgen@pasteur.ac.ir
Websites: www.emgen.net
www.emhgbn.net

Prepared by: Clara Bieler
Page design: Fazeleh Hosseinpour
Assistant editor: Fazeleh Hoseinpour
Editor: Dr. S. Sardari

STATUS OF THE BIOTECHNOLOGY AND PHARMACEUTICAL INDUSTRY

INSIGHTS FOR AUSTRIA AND THE EUROPEAN UNION

Introduction

This industry review aims to provide an overview of the status of the biotechnology and pharmaceutical industry in Austria, more specifically their development, industry structure and organization, as well as the focus areas and competence clusters.

Country brief Austria:

State treaty in effect: 15th May 1955

European Union Membership: 1st January 1995 (4th enlargement)

Population: 8,662,588 (2015 estimate)

GDP: nominal: $403,768 billion (International Monetary Fund, 2015)

Government: Federal parliamentary republic

Given its membership in the European Union, Austrian directives are influenced by the policies and initiatives of the Union, e.g. with regards to biotechnology and genomics research. As such, understanding the industry in Austria is to a certain extent, understanding the European outlook and the policy for biotechnology and reference will be made to European Union ruling throughout this review.

History, sector characteristics and figures

Industry facts:

Number of companies: 116 dedicated* (2014) (+22% from 2012)

Number of employees: 1,660 (61.2% of companies <10 employees)

Turnover: € 198 million

*OECD Definition; Source: Life Science Report Austria, 2015

Biotechnology

Biological research has a long tradition in Austria, i.e. Gregor Mendel, Theodor Escherich, Ignaz Semmelweis. The biotechnology industry in Austria is relatively young, but with the initiation of the national biotechnology program (1999) and the later inception of the Life Science Austria (LISA) initiative (2002), came impetus for growth.

On average, companies active in this sector were founded 8-12 years ago, nonetheless, the sector enjoys fast growth and now constitutes an important business factor in Austria. The industry is regarded to be mature and saturated. Most Austrian biotech firms are small; almost all fall into the EU-defined category of small and medium-sized enterprises (SMEs), i.e. having less than 250 employees.

Austria is also home to a wide range of companies with activities that are not dedicated exclusively to biotechnology (companies with < 75% biotechnology-related businesses), including pharmaceutical and chemical companies, food-stuff manufacturers or energy companies that employ biotechnological techniques to improve their industrial processes. The combined turnover of these companies clearly surmounts € 4 billion in 2014.

Pharmaceuticals

The pharma industry in Austria is composed of traditional firms, which are historically rooted in the country – mostly SMEs. The pharmaceutical quota for Austria (share of expenses for pharmaceuticals on the total health sector expenditures) was 12.2 % in 2013.

Industry facts:

Number of companies: 32 (2014)

Number of employees: 3,100 (68.7% with 50 – 99 employees)

Turnover: € 1,1 billion

Source: Life Science Report Austria, 2015

Austria is strategically located, at the heart of Europe, and as a result, also hosts several globally active pharma companies who have established sales, R&D and distribution offices, to penetrate the Austrian and European market (especially Central and Eastern Europe). Examples for this are Baxter/ Baxalta, Pfizer, Boehringer-Ingelheim, Sandoz, Eli Lilly, Merck, Janssen, Sanofi-Aventis, GlaxoSmithKline, etc.

Key fields and research institutions

Globally, healthcare represents the most important area of biotechnology applications; this also holds true for Austria, where the health and medicine branch represents 66.4% of all companies active in biotechnology. The Austrian biotechnology sector is predominantly focused on red and some white biotechnology. Other branches include non-specific applications, industrial biotechnology, and agricultural biotechnology.

Austrian pharma companies traditionally focus on chemically synthesizes molecules or natural compounds; however some pharma companies also have a mixed spectrum of drug portfolios. In general, Austria has a favorable regulatory environment and a well-regulated clinical research industry. In Austria, drug regulation is administered by the Austrian Federal Agency for Safety in Health Care, which is part of the medicines regulatory authority (MRA).

Given the complex process of developing and producing drugs and diagnostics, another noteworthy group in Austria`s biotechnology and pharma sector are specialized supplier companies, a landscape of roughly 24 companies in 2014. The combined turnover of these companies was € 604 million in 2014. Furthermore, the sector includes 26 service providers, active in biotechnology and pharma, which combined achieved a total turnover of € 103 million in 2014.

In the healthcare and medical domain, the three biggest fields of research include drugs for the treatment of infectious or parasitic diseases, cancer treatments (e.g. neoplasms field) and respiratory system diseases [in this order]. Furthermore, diseases of the blood and immune system (clinical programs), diseases of the skin and subcutaneous tissue as well as diseases of the circulatory system, endocrine, nutritional and metabolic diseases, diseases of the digestive system and diseases of the musculoskeletal system and connective tissue form other relevant areas of research.

Austria`s life science sector, and its biotechnology sector more specifically, benefit largely from the dense academic life science scene in Austria. Amongst the biggest universities are the Medical University of Graz, whose research focus lies cardiovascular research, cancer research, molecular bases of lipid associated diseases and neuroscience. In addition, the Innsbruck Medical University focuses on molecular biosciences, neurosciences, cancer research, molecular imaging and sports medicine. The Medical University of Vienna is strong in interdisciplinary and translational research, with clinical programs covering allergology and immunology, oncology, neuroscience and vascular medicine.

Next to universities, the Austrian Academy of Sciences (AAS), promotes non-university based academic research, such as e.g. Institute of Science and Technology Austria (IST Austria) and the Austrian Institute of Technology (AIT).

Industry bodies and competence clusters

In order to deploy a structural research and development framework, several business and research support agencies have been created: e.g. Advantage Austria, a trade promotion organization network, ABA – Invest in Austria, a government-operated consulting firm for international investors, Austrian Biotech Industry, which is part of the Austrian Chemical Industry Association, a special interest group constituted by well-established and biotechnology start-ups, and the Association of Research and Development Based Pharmaceutical in Austria, which is committed to making innovative medicine accessible.

Austria is often cited as a successful example on how the government or regional/local authorities together with industries are fostering the development of clusters in biotechnology. In Austria, the clusters are predominantly concentrated in five states and are bundled and administrated under the umbrella name "Life Science Austria" (LISA), an organization that promotes the life science sector in Austria. LISA is run by the Austrian Wirtschaftsservice GesmbH (AWS) on behalf of the Federal Ministry of Economy, Family and Youth. The cluster players feature a high level of internationality; encompass specialized companies, SMEs, spin-offs, and international R&D headquarters, that cooperate intensely with research institutes.

ecoplus – Technopol Program (Lower Austria) consists of different locations that have their individual research subjects: e.g. Krems for medical biotechnology, Tulln for agro- and environmental biotechnology, Wiener Neustadt for surface technologies, and Wieselburg/Mostviertel for bio-energy, agricultural and food technology.

The Health Technology Cluster (HC) (Upper Austria) is a network, spanning a number of business sectors, whose scope of activities includes the medical electronics, software, clean room and hygiene, hospital equipment, end-use products, diagnostics, pharmacy and materials (metal/ plastics).

Human.technology Styria is an initiative focused on strengthening the competitive capabilities of Styrian companies, institutions and scientific bodies, whereby emphasis is given to three strategic corridors: a) pharmaceutical engineering and production processes, b) advanced biomedical sensor technologies and biomechanics, b) biobanking and biomarker technologies.

LISAvienna – Life Science Austria Vienna is the life science cluster organization of the City of Vienna. The focus lies on medical biotechnology, more specifically on areas of immunology, anti-infectives, and oncology

Cluster Life Science Tirol is a cluster management platform that brings together Tirolean research institutions in life sciences. The cluster links a total of 63 partners that is 2/3 of all life science companies in Tirol and all the relevant Tirolean research institutions.

Corporate landscape

In Austria, biotechnology startups used to emerge from university spin-offs, but more recently, corporate spin-offs are becoming more popular, whilst the "traditional" sites are kept (e.g. Campus Vienna Biocentre, Graz, Innsbruck, Salzburg, Krems). To name a few example of Austrian companies in the biotechnology and the medical sector, e.g. AVIR Green Hills Biotechnology AG, Nabriva Therapeutics, Intercell AG or BIOCRATES Life Sciences AG. Across Austria, a succession of science parks, incubators and tech transfer initiatives has ensured the growth of the industry.

From an economic point of view, local and multinational companies constitute a significant economic factor for the Austrian economy. The combined turnover of all Austrian sales and distribution offices specialized in biotechnology and pharma, aggregated to € 5, 22 billion (2014). Most sales and distribution offices focus on human and animal healthcare, whereby the range extends from fairly simple products to quite complex high-tech products (e.g. state-of-the-art anti-cancer therapies).

Next to biopharmaceutical or chemically synthesized drugs, Austrian sales and distribution offices supply plant-based phytopharmaceuticals or homeopathic drugs as well as dietary products. Furthermore, companies focusing on diagnostic products are certified either as an *in vitro* diagnostic for human use (CE-IVD) or as a research-only tool are also present.

References:

1. ABA, 2015, *Austria Issue*, [pdf], accessed 23rd July, available at: http://investinaustria.at/en/downloads/brochures/life-sciences-2015.pdf.

2. AWS, 2015, *Biotechnolgy/Pharma*, [online], accessed 23rd July, available at: http://www.lifescienceaustria.at/life-sciences-in-oesterreich/zahlen-und-fakten/biotechnologie/.

3. AWS, 2015, *Life Science Report 2015*, [pdf], accessed 23rd July, available at: http://www.bmwfw.gv.at/Presse/Documents/LifeScienceReport-Austria_2015.pdf.

4. Dorda Brugger Jordis Rechtsanwälte GmbH, 2014, *State Aid in Life Sciences in Austria*, [pdf], accessed 25th July, available at: http://www.biolegis.com/uploads/tx_articles/State_Aid_in_Life_Sciences_in_Austria_BIOLEGIS_200212.pdf.

5. Ecoplus, 2016, *Über uns*, [online], accessed 25th July, available at: http://www.ecoplus.at/de/ecoplus/ueberuns?gclid=CjwKEAjw8da8BRDssvyH8uPEgnoSJABJmwYoFUydszsgDgpN1gpeLi6PaZJ7SE4fangyQDvZQKCD0hoCaPXw_wcB.

6. EY & Europabio, 2015, *Biotechnology in Europe: tax, finance and regulatory framework and global political comparison*, EY Publishing.

7. FASresearch & Industriewissenschaftliches Institut, 2015, *Thesenpapier zu Wertschöpfungsökologie der Biotech in Österreich. Stärken, Schwächen und Chancen*, [pdf], accessed 23rd July, available at: http://www.rat-fte.at/tl_files/uploads/Studien/141210_FAS-IWI_Thesenpapier_BiotechOe.pdf.

8. Horn International AS, 2015, *European Biotechnology – a medical focus*, [pdf], accessed 25th July, available at: http://www.hornonline.com/books/european_biotechnology/index.html#42/z.

9. Human Technology, 2016, *Home*, [online], accessed 25th July, available at: http://www.humantechnology.at/

10. LISAVienna, 2016, *LISAVienna*, [online], accessed 25th July, available at: http://lisavienna.at/.

11. Medizintechnik Cluster, 2016, *Startseite*, [online], accessed 25th July, available at: http://www.medizintechnik-cluster.at/.

12. FASresearch & Industriewissenschaftliches Institut, 2015, *Thesenpapier zu Wertschöpfungsökologie der*

Biotech in Österreich. Stärken, Schwächen und Chancen, [pdf], accessed 23rd July, available at: http://www.rat-fte.at/tl_files/uploads/Studien/141210_FAS-IWI_Thesenpapier_BiotechOe.pdf.

13. Horn International AS, 2015, *European Biotechnology – a medical focus*, [pdf], accessed 25th July, available at: http://www.hornonline.com/books/european_biotechnology/index.html#42/z.

14. Human Technology, 2016, *Home*, [online], accessed 25th July, available at: http://www.humantechnology.at/

15. LISAVienna, 2016, *LISAVienna*, [online], accessed 25th July, available at: http://lisavienna.at/.

16. Medizintechnik Cluster, 2016, *Startseite*, [online], accessed 25th July, available at: http://www.medizintechnik-cluster.at/.

17. Mizuhobank, 2014, *Life Sciences and Biotechnology Industry Clusters in Europe - Series 2 -- Recent Trends and Partnership Strategies for Growth and Expansion*, [pdf], accessed 24th July, available at: http://www.mizuhobank.com/fin_info/industry/pdf/mif_147.pdf.

18. Standort Tirol, 2016, *Cluster Lifesciences Tirol*, [online], accessed 25th July, available at: http://www.standort-tirol.at/page.cfm?vpath=cluster/fachbereiche/life-sciences#schwerpunkte.

19. Wirtschaftskammer Österreich, 2016, *Überblick: Zukunftsbranche Österreich*, [online], accessed 24th July, available at: http://www.advantageaustria.org/international/zentral/business-guide-oesterreich/importieren-aus-oesterreich/branchen/life-science-und-pharma/Ueberblick.de.html

OUTLOOK BIOTECHNOLOGY IN AUSTRIA

Governmental Initiative and Funding

Austria ranks among the most prosperous and innovative countries in the European Union. In line with this, the Austrian Council for Research and Technology Development has defined biotechnology as one of ten priority areas of research to benefit from special support. For the period of 2011-2020, the Austria Federal Ministry of Economy, Family and Youth has released a framework for the national R&D strategy. Within this framework, an "Action Plan Biotechnology" was introduced, with the aim of increasing the size of this research intensive sector within the next five years, in particular through new financial support program.

Many regulatory and legislative matters are aligned on a European level: e.g. on patents, the Directive on Biotechnological Inventions from 1998 (European Commission) has been implemented without national amendmentsments. Likewise, for market access regarding chemicals is regulated via the European REACH System. On the other hand, marketing of genetically modified organisms (GMO) is partly restricted, whereby Austria does not follow European Union rules.

It is noteworthy that Austrian biotechnology companies are very research-focused; the research-factor is 21%. In 2014, funding of the Austrian biotech sector totaled around **€** 86,8 million from venture capitalists, private investors, grants and loans. Austria has developed a wide range of federal (Österreichische Forschungsförderungsgesellschaft, Österreichische Nationalbank), national (Austria Wirtschaftsservice, Austrian government promotional bank i.e. LISA PreSeed and LISA Seedfunding) and regional (INiTS, ZIT, SFG, etc) funding schemes, focused on start-up ideas as well as established companies.

Strategic framework for Life Sciences

Cutting-edge research at Austrian universities is at the heart of the technology transfer activities, out of which many biotechnology start-ups emerge. As European countries move steadily towards a "knowledge-based economy", Austria is building a profile in the life science sector by improving structure, sites and attractive funding opportunities.

Notable is the commitment of the Austrian government to this sector, and its aims to create and foster a favorable business environment for spin-offs and established (international) companies alike. In 2015, the estimated R&D investment was 3.01% of the Austrian GDP. This made Austria`s investment higher than the EU-average, which was at 2.02% in 2011. The governmental strategy continues to reflect the commitment towards research, development and innovation; the aim is to make Austria an innovation leader within the European Union and to raise the share of R&D investment to 3.76% of GDP by 2020. Another measure on this quest was the release of a very supportive and attractive tax regime, which entails a R&D cash premium of 10% and a maximum corporate income tax of 25%.

Following the implementation of the "Action Plan Biotechnology" (see also Governmental Initiative and Funding), an even larger comprehensive strategic framework for life sciences, intends to cover the whole innovation chain for early research to market uptake. In Austria, academia and industry have established strong links, and also the sectors biotechnology, pharma and medical devices are well-connected. As the pharmaceutical industry expands steadily, this well-connected ecosystem of high-quality healthcare, industry, academia and private public partnerships also make Austria an interesting prospect for SME start-ups and investors.

As such, Austria has laid the groundwork for future challenges: personalized medicine, targeted drugs and companion diagnostics, just to name a few. Also, multi-million licenses and development deals between small Austrian biotech companies and bio pharma companies serve as proof for the international interest in the Austrian life sciences industry. Examples hereto are the joint-venture between Boehringer Ingelheim Austria and the Austrian Academy of Sciences to establish the Institute for Molecular Biotechnology of the Austrian Academy of Sciences (IMBA), or the establishment of the Antibiotic Research Institute (ABRI) as a result of the cooperation between Novartis and the foundation of Baxter Bioscience's Global Pathogen Safety Centre of Excellence, just like their vaccine production facility.

Due its dynamic and interconnected biotechnology landscape together with the traditional pharma sector and the commitment to research and development, Austria is becoming an important source for innovation in the health sector. For example, in 2014, a total of 98 compounds were preclinical development or in one of the three phrases of clinical development (from 77 Austrian dedicated biotechnology companies).

Genomics research in Austria and the European Union

The Biomedical Sequencing Facility (BSF) is the first technology platform in Austria dedicated for NGS (next -generation sequencing) in biomedicine. BSF is set up as part of the joint genomics core facility or the Medical University of Vienna and the CeMM Research Center for Molecular Medicine of the Austrian Academy of Sciences.

The Medical University of Vienna itself operates a facility (Core Facility Genomics), which is a full-service genomics facility that provides scientists and clinicians with services required for RNA expression profiling and DNA variation analysis. For example, the facility offers an Affymterix GeneChip microarray platform and an Illumina HiSeq2000 next generation sequencing instrument.

The CeMM Research Centre for Molecular Medicine of the Austrian Academy of Sciences focuses on biomedical challenges in the field of cancer, immune disorders and infectious diseases. Taking an interdisciplinary approach, the CeMM scientists also utilize a variety of biomedical techniques, including post -genomic technologies (e.g. proteomics, chemical biology, and bioinformatics, all of which have been established in-house).

The BSF is expected to play a catalyzing role in the development of genomic medicine in Vienna and Austria. Currently, BSF is engaged in research support and consulting for a broad range of applications of sequencing and biomedicine, including sequencing service using HiSeq 3000/4000, HiSeq 2000, and MiSeq instruments of the Illumina platform, other sequencing technologies (e.g. Ion Torrent/Proton, Illumina NextSeq, Pacific Biosciences, Oxford Nanopore, Complete Genomics, Roche 454), automatized library preparation services (RNA-seq, exome-seq, whole genome sequencing) and protocols (e.g., ChIP-seq, DNA methylation, open chromatin, targeted validation sequencing, etc.) as well as bio-informatic processing, analysis and assistance with data interpretation.

BSF is directed by Christoph Bock who is a Principal Investigator at CeMM and a Guest Professor in Medical University of Vienna`s Department of Laboratory Medicine. Furthermore, Mr. Bock is a member of the European BLUEPRINT project, a large-scale research project that has received close to € 30 million in funding from the European Union. It currently involves 42 leading European universities, research institutes and in-

dustry entrepreneurs and will be one of the two first so-called high impact research initiatives to receive funding from the European Union. The BLUEPRINT project contributes to the work of the International Human Epigenome Consortium, that has the aim to map 1,000 reference epigenomes.

The BSF also performs genome sequencing and analysis for "Genom Austria" (see also http://genomaustria.at), the Austrian Personal Genome Project, for which Mr. Bock is the project leader. The Austrian Personal Genome Project is the Austrian member in the Internatinal Network of Personal Genome Projects.

Comment: in Austria, there is an ongoing debate whether the existing strict regulation on biotechnology issues (e.g. laws and guidelines related to the property situation of human and genetic banks, volume restrictions on materials, new product registration, etc.). have a negative impact on R&D in Austria. In particular, regulations related to clinical implementation of new processes, genetics, pharmaceuticals, etc. may add challenges to market access

Biotechnology in Europe

Industry facts – European health care biotech sector

Market reach: 20 - 30 million patients

Key treatments: insulin, Factor VIII coagulant for haemophiliacs, vaccines, cancer

Market size: > 20% of all marketed medicines

Sector size: >1700 companies (market worth > € 17 billion)

Source: EY Biotech Report, 2015

Overview

In Europe, biotechnology clusters and their organization play a crucial role in the industry growth and development, as they connect academia, industry, policy makers and investors and provide the platform for interaction and collaboration. This is important for innovation, commercialization, spin-offs and start-ups, securing funding and business development. Typically, in Europe, companies are concentrated in clusters in western and northern Europe, which already have a long tradition of life sciences and biotechnology research (e.g. pharmaceuticals, chemicals, agro-production and medical technologies).

Mature healthcare (red biotechnology) clusters are concentrated in Belgium, Denmark, France, Germany, Sweden, Switzerland and UK. The clusters in Spain, Italy, Netherlands and Austria are examples for how governmental and regional authorities can foster cluster creation and development.

European Bioeconomy strategy

In 2002, the European Commission adopted a comprehensive action plan and strategy for the establishment and development of biotech-based products with the aim of ensuring that EU-policies concerning biotechnology would be implemented consistently and efficiently. Since then, the European Union has developed a holistic approach to policy-making for the bioeconomy. To this end, the European Commission made its life sciences and biotechnology strategy part of the Europe 2020 strategy and the Innovation Union flagship program.

The Horizon 2020 Strategy is the European Union`s growth strategy that is based on five objectives – employment, innovation, education, social inclusion and climate/energy. Each member country has adopted nation targets for these areas and furthermore, concrete actions at EU and national level are aimed at further strengthening the strategy. The innovation Union program forms part of the Horizon 2020 strategy and is an initiative aimed at an innovation-friendly Europe to create smart, sustainable and inclusive growth. In line with these goals, policies are devised to impact biotechnology, e.g. bio-based products, healthcare industries, key enabling technologies, cluster and biotechnological inventions.

Challenges ahead

Austria is considered to be a latecomer in the development and commercialization of biotechnology; at present, there are two major national policy initiatives (LISA Life Science Austria and the Austrian Genome Project) that promote biotechnology. Austrian funding schemes were for a long time focused on generic R&D support, i.e. a limited number of promotion measures, which prevented the introduction of structural and thematic programs which were then rather dispersed and required participation of industry and science. The later, is yet another topic under development in Austria, as there is no earlier tradition of cooperation between industry and academia in this field; thus no institutional blueprints.

As Austria transformed into a country with above EU-average R&D investments, policy advisors have pointed out that the catch-up will merely achieve exploitation and applications rather than development of new ones, as a result of which growth potential inherent to these activities has been shrinking. To date, one of the key challenges for the Austrian biotechnology industry is to focus its activities, especially with regards to the advancement of technologies and knowledge. To this end, Austria has set the course for building on its strengths and occupying new fields and niches.

Europe`s strength in biotechnology is one of its most important industrial assets and the research-intensive sector contributes greatly to Europe`s knowledge-based economy, central to its future growth. To achieve ongoing growth, policy-making will need to continue to foster innovation and entrepreneurial risk-taking. This holds not only for the European Union research frameworks and strategies, but also for the national governments of the member countries.

References:

1. AWS, 2015, *Life Science Report 2015*, [pdf], accessed 23rd July, available at: http://www.bmwfw.gv.at/Presse/Documents/LifeScienceReport-Austria_2015.pdf.
2. AWS, 2013, *Life Science Report 2013*, [pdf], accessed 1st August, available at: http://www.bmwfw.gv.at/Presse/Documents/LifeScienceReport-Austria_2013.pdf.
3. Biomedical Sequencing Facility, 2016, *Overview*, [online], accessed 26th July, available at: https://www.biomedical-sequencing.at/BSF/index.php?option=com_content&view=article&id=84&Itemid=481.
4. BluePrint-Epigenome, 2016, *Abstracts*, [online], accessed 26th July, available at: http://www.blueprint-epigenome.eu/.
5. Dinges, M, 2007, Monitoring and analysis of policies and public financing instruments conducive to higher levels of R&D investments: The “Policy Mix” project – Case Study, Joanneum Research, Graz.
6. European Commission, 2016, *Horizon 2020*, [online], accessed 26th July, available at: http://ec.europa.eu/europe2020/index_en.htm.
7. EY & Europabio, 2012, *What Europe has to offer to biotechnology companies*, [pdf] accessed 26th July, available at: https://www.biodeutschland.org/tl_files/content/dokumente/biothek/2012/EuropaBio_Ernst_and_Young_report.pdf.

8. EY & Europabio, 2015, *Biotechnology in Europe: tax, finance and regulatory framework and global political comparison*, [pdf], accessed 23rd July, available at: http://www.biotechweek.org/wp-content/uploads/2014/05/ey-europabio_report_final_1.pdf.

9. InvestinEU, 2016, *Biotechnology Industry in the European Union*, [online], accessed 25th July, available at: http://www.investineu.com/content/biotechnology-industry-european-union.

10. Jessop, N., 2013, European Biotech struggles to thrive, [online], accessed 26th July, available at: http://www.pharmexec.com/european-biotech-struggles-thrive?id=&pageID=1&sk=&date=.

11. Medical Epigenomics Lab, *Overview*, [online], accessed 26th July, available at: http://www.medical-epigenomics.org/.

12. Medical University of Vienna, 2016, *Core Facility Genomics*, [online], accessed 26th July, available at: http://corefacilities.meduniwien.ac.at/genomics/?L=1.

13. Mizuhobank, 2014, *Life Sciences and Biotechnology Industry Clusters in Europe - Series 2 -- Recent Trends and Partnership Strategies for Growth and Expansion*, [pdf], accessed 24th July, available at: http://www.mizuhobank.com/fin_info/industry/pdf/mif_147.pdf.

14. Naturejobs, 2016, *Spotlight on Austria*, [online], accessed 25th July, available at: http://www.nature.com/naturejobs/science/articles/10.1038/nj0010

15. Research Center for Molecular Medicine of the Austrian Academy of Sciences, 2016, *Groups*, [online], accessed 26th July, available at: http://cemm.at/research/.

16. Trippl, M., 2007, *Developing biotechnology clusters in non-high Technology Regions: The case of Austria*, Institute for Regional Development and Environment, Vienna University of Economics and Business Administration, Vienna.

17. WWTF Matchmaking Event, 2015, *Participants*, [online], accessed 26th July, available at: https://www.b2match.eu/wwtf-precision-medicine/participants/53.

INSTITUTE PASTEUR & AUSTRIAN BIOTECH COLLABORATE ON WORLD ZIKA VACCINE PLAN

At the beginning of last month, Themis, a Viennese vaccine developer announced an extension of the existing license agreement with the Institute Pasteur in Paris, under which the company is able to access a well-established virus vaccine vector technology. Having already proven the safety and tolerability profile of the vector in a phase I trial, when developing a first-in-class chikungunya vaccine (phase II expected later this year), the two partners will now apply the platform to the Zika-vaccine, a high priority project within Themis`s pipeline.

Reference: http://labiotech.eu/zika-themis-pasteur-vaccine/.

PROTEIN COAT FOUND TO HELP CHROMOSOMES KEEP THEIR DISTANCE

The team led by Daniel Gerlich from the Institute of Molecular Biotechnology of the Austrian Academy of Science, discovered that the protein Ki-67 prevents chromosomes from sticking together in dividing cells. The findings were published in the current issue of nature and show how the chromosomes merge into a single mass with Ki-67, rendering them immobile. Now the team will search for other proteins with surfactant-like properties.

Reference: http://www.lifescienceaustria.at/en/a-protein-coat-helps-chromosomes-keep-their-distance/.

EMGEN'S INTERNSHIP

EMGEN in collaboration with AIESEC accepted 2 interns, Clara Bieler and Yusi Zhu from Austria and China.

That internship in Tehran, Pasteur Institute of Iran provides an opportunity to link international aspects of health biotechnology on Europe and Asia for EMGEN's aims.

Data were presented on EMGEN international webinars and internal seminars.

Furthermore, documents are published on our newsletters which is specialized in analyzing status of bio-technology.

REPRODUCTIVE BIOMEDICINE ONLINE

ISSN: 1472-6483

Reproductive BioMedicine Online includes the information about growth and differentiation of the human embryo. Its goal is publishing new research on biological and clinical research on human reproduction and the human embryos.

Impact Factor: 2.796

HEALTH POLICY

ISSN: 0168-8510

Health Policy is intended to be a vehicle for the exploration and discussion of health policy and health system issues and is aimed in particular at enhancing communication between health policy and system researchers, legislators, decision-makers and professionals concerned with developing, implementing, and analyzing health policy, health systems and health care reforms, primarily in high-income countries outside the U.S.A.

Impact Factor: 2.035

INTERNATIONAL JOURNAL OF MEDICAL INFORMATICS

ISSN: 1386-5056

International Journal of Medical Informatics makes an international medium available for distribution of original results and reviews relating to medical informatics. The Journal highlights the evaluation of systems in healthcare sites.

Impact Factor: 2.363

Book Alert

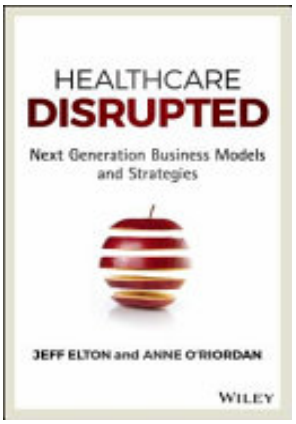
INNOVATION IN MEDICINE AND HEALTHCARE 2016

Editors: Yen-Wei Chen, Satoshi Tanaka, Robert J. Howlett, Lakhmi C. Jain

Publisher: Springer International Publishing, 2016

ISBN: 3319396870, 9783319396873

HEALTHCARE DISRUPTED: NEXT GENERATION BUSINESS MODELS AND STRATEGIES

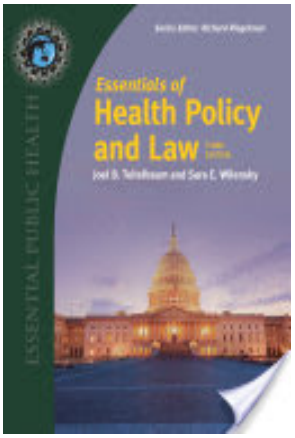


Authors: Jeff Elton, Anne O'Riordan

Publisher: Wiley, 2016

ISBN: 1119171903, 9781119171904

ESSENTIALS OF HEALTH POLICY AND LAW



Authors: Joel B. Teitelbaum, Sara E. Wilensky

Publisher: Jones & Bartlett Publishers, 2016

ISBN: 1284087549, 9781284087543

Announcements

http://bioscienceconference.com/

https://www.biochemistry.org/Events/tabid/379/MeetingNo/81HDN/view/Conference/Default.aspx

http://www.ilkdresden.de/index.php?id=1149

AUSTRIA ACADEMY OF SCIENCES

The Österreichische Akademie für Wissenschaften (German) was founded in 1921 and is a legal entity under special protection of the Austrian Republic. As an academy, it is the institution`s mission to promote the sciences and humanities, particularly in fundamental research. The Academy of Sciences has established 25 additional institutions, notably the Institute of Molecular Biotechnology which was founded as a joint initiative with German Boehringer Ingelheim. The facility, which also collaborates closely with the Research Institute for Molecular Pathology (Boehringer`s basic research centre), provides scientist in biological molecular research state-of-the-are infrastructure, e.g. sequence analysis, scientific data mining, flow cytometry, microscopy, etc. Other facilities of the Austrian Academy of Science with a focus on natural sciences include the Gregor Mendel Institute, the Institute of Quantum Optics and Quantum Information, the Acoustics Research Institute and the Space Research Institute.

Reference: https://en.wikipedia.org/wiki/Austrian_Academy_of_Sciences#/media/File:Akademie_d_Wissenschaften_Wien_DSC1282w.jpg

ZIKA VACCINE

Starting mid-2016, the Zika visus, a mosquito-borne disease, is ongoing in the Americas and the Pacific. To date, there are no known cures for Zika, there have however been recent developments in Zika vaccination. One such project is spearheaded by Themis, a Vienna-based vaccine developer. With a compatible technology platform in place, the company has extended its present license agreement with Institut Pasteur in Paris. The cooperation allows it access to established virus vaccine vector technology. Currently, Innovio, who already got FDA approval for a Phase I trial, is the leader in the race.

Reference:https://en.wikipedia.org/wiki/2015%E2%80%9316_Zika_virus_epidemic#/media/File:Aedes_aegypti.jpg

ARS ELECTRONICA CENTRE

The Ars Electronica Centre, also known as the „Museum of the Future", exhibits most modern techniques from the technology sector. Following an extensive redesign, it was re-opened in 2009 and is now home to 3000m^2 for exhibitions, 100m^2 for research and development, 400m^2 for workshops and conferences, 650m^2 for catering and another 1000m^2 of public space for various types of events. The main gallery (1000 m^2) houses the exhibition called "New Views of Humankind", that focuses on topics like biotechnology, robotics, rapid prototyping and the human body. This area is further subdivided into „labs", whereby the Bio-Lab`s focus lies specifically on biotechnology and its applications.

Reference: https://en.wikipedia.org/wiki/Ars_Electronica#/media/File:ARS_Electronica_Linz_Austria_(3822117769).jpg