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Academic and Corporate Health Care
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Life Sciences in Austria - facts and figures

Vienna can look back on an excellent scientific tradition in the field of medical research. Semmelweis, Billroth and Landsteiner are part of this history. The outstanding reputation of the Vienna Medical Schools continues to grow today – in academia and on the business side.

With 823 companies active in the biotechnology, pharma or medical device business, life sciences are an important part of Austria’s economy. Together, these companies were responsible for a turnover exceeding 19.11 billion euros in 2014 – about 5.8 percent of the gross domestic product. About 51,660 people earn a living working for an Austrian life science company. Austrian medical universities focus on state-of-the-art R&D for new therapeutic substances with approximately 20,000 people involved in academic life science research and education. Graz, Innsbruck and Vienna are the most important places for the life sciences in Austria.

The Austrian capital city Vienna plays an outstanding role in the life sciences - not only on the national level, but also internationally. In 2014, a total of 480 companies, research institutions and further core organizations were active in the life science sector in Vienna, having a combined workforce of 35,730 people.

Many global pharmaceutical companies and medical device players operate a strategic presence in Vienna. Some even carry out research and development or manufacturing in Austria. These include Agfa, Boehringer Ingelheim, Novartis, Octapharma, Ottobock, Pfizer and Shire. A growing biotech and medical device start-up community boosts innovation. Each year, more than ten new life sciences companies open their doors in Vienna and strive to conquer a variety of market niches.
Vienna is clearly in first place in Austria when it comes to education and research in the field of life sciences. Five universities, two universities of applied sciences and eleven non-university research institutes employ 12,000 members of staff, which is 60% of all academic employees in this field in Austria. With roughly 33,000 students in the area of life sciences, Vienna educates more young scientists than the rest of Austria. A multitude of publications (4,816 in 2014) in international journals is evidence of the excellent research work in Vienna. Grants provided by the European Research Council became another indicator for quality: Until the end of 2014, Vienna based researchers succeeded in attracting 54 ERC grants in the life sciences. This represents 81% of all ERC grants in Austria in this sector.

Austrian Academy of Sciences: Two outstanding health related institutes in Vienna

At the CeMM – Research Center for Molecular Medicine (200 employees), researchers engage in the integration of basic research and clinical expertise. CeMM’s research is based on post-genomic technologies and focuses on societally important diseases, such as immune disorders and infections, cancer and metabolic disorders. CeMM operates in a unique mode of connecting biology with medicine, experiments with computation, discovery with translation, and science with society and the arts. At the IMBA – Institute of Molecular Biotechnology (200 employees), the focus rests on investigating fundamental molecular processes to advance biomedicine. Model organisms and cutting-edge technologies, like deep sequencing, functional screening, cellular RNAi, as well as stem cell and imaging techniques are used to examine the role of genes in physiology and pathogenesis.

Core research topics at the IMP - Research Institute of Molecular Pathology

The common goal of the IMP-scientists is to elucidate the mechanisms and principles that underlie complex biological processes. Research at the IMP spans a wide range of topics, broadly organized into these areas: molecular and cellular biology, structural biology and biochemistry, gene expression and chromosome biology, stem cell biology and development, immunology and cancer as well as neuroscience. Recently, Boehringer Ingelheim, the main sponsor of the IMP, has invested 52 Million Euros in a new IMP-building at the Vienna Biocenter, which will host some 250 researchers.

Selected research topics addressed in Academia
Medical University of Vienna: Most important partner for clinical research in Austria

The Vienna General Hospital is one of Europe’s largest clinics and closely intertwined with the Medical University of Vienna, one of the world’s leading medical universities (5,500 employees, 8,000 students). 2.2 billion euros will be invested until 2030 to bring medicine to the next level: A new strategy plan and first-class equipment and facilities will benefit patients, research and teaching at Austria’s most important healthcare institution.

MedUni Vienna is the perfect partner for conducting all stages of clinical trials in almost any indication. A Clinical Trials Coordination Center facilitates access to experienced partners and stands for professional management of clinical research endeavors. In addition, basic medical research and technology development have a long tradition and are open to collaboration. Five outstanding research clusters have been established, focusing on immunology, cancer, medical neuroscience, medical imaging and cardiovascular diseases. For looking beyond common diseases, the Vienna Center for Rare and Undiagnosed Diseases (CeRUD) has been set up together with CeMM, the Research Center for Molecular Medicine of the Austrian Academy of Sciences, as a core contact.

The Max F. Perutz Laboratories (MFPL) are a center established by the University of Vienna and the Medical University of Vienna to provide an environment for excellent, internationally recognized research and education in the field of Molecular Biology. On average, the MFPL host 60 independent research groups, involving more than 500 people from 40 nations. Research at the MFPL is curiosity-driven and spans the field of Molecular and Cell Biology. Most groups investigate basic research questions but a significant number are also active in more applied fields of biology.

Current Highlight: ABSCG to manage Pfizer’s global PALLAS trial (excluding the US)

Pfizer is one of Austria’s leading life sciences companies and continuously invests in clinical research. An outstanding example is the PALLAS trial. The EUR 340 million phase III study is designed to evaluate whether a specific CDK inhibitor is able to reduce the risk of breast cancer recurrence when taken in combination with endocrine therapy in the adjuvant setting. Except for the US, global study management is carried out by the academic study group ABSCG (Austrian Breast & Colorectal Cancer Study Group) in Vienna. The ABCSG is Austria’s biggest and most renowned academic study group. More than 25,400 patients have participated in ABCSG trials since 1984.

Broad expertise at the University of Vienna

The Faculty of Life Sciences at the University of Vienna is characterized by a great variety of disciplines, which include all aspects of life, its development, evolution and diversity, and its interaction with the environment. The focus of research embraces many different approaches ranging from genetic and (functional) genomic focuses to structural analysis, as well as from physiology and ecology to biomathematics, in-silico approaches and theory formation. Drug discovery from nature is one of the
research areas addressed at the Department of Pharmacology and Toxicology.

**Industrial biotechnology at ACIB, BOKU and TU Wien**

The University of Natural Resources and Life Sciences (BOKU) has been working on biotechnological research for 70 years, making Vienna one of the traditional biotechnology locations worldwide. Strong expertise in applied microbiology, food science, applied genetics and chemistry is available. The university’s Bio-Industrial Pilot Plant and other core facilities also benefit the Austrian Centre of Industrial Biotechnology (ACIB) and TU Wien for example. ACIB’s research program includes development of new microbial and mammalian expression systems and concepts, extended innovative applications of biocatalysis, improvement of bioprocesses and understanding bioproduction on a molecular and genome wide basis with high relevance for biopharmaceutical manufacturing processes.

**Veterinary medicine: Innovation meets tradition**

The University of Veterinary Medicine, Vienna is the only academic educational and research institution in Austria that focuses on the veterinary sciences and at the same time the oldest such institution in the German-speaking region. Current research topics include animal health, preventative veterinary medicine, comparative medicine, animal models, public health services, food safety, animal husbandry, animal welfare and animal ethics as well as organismic biology and biodiversity.

**Applied sciences in Vienna: Sense of societal and economic needs**

In the field of applied sciences, The Center of Health & Bioresources at the Austrian Institute of Technology (AIT) develops inventions and solutions that enable early disease detection and support healthy and active aging. This is made possible through ambient assisted living technologies, molecular diagnostics and imaging, innovative implants and prostheses, contactless radio technology and cardiovascular research. Additionally, Vienna is home to two universities of applied sciences:

The University of Applied Sciences Technikum Wien is the largest Austrian technical applied university with emphasis on biomedical engineering, e-health and renewable technologies. The University of Applied Sciences FH Campus Wien on the other hand is the largest Austrian applied university. Within the field of life sciences, it educates its students in the areas of bioengineering, bioinformatics and molecular biotechnology, among others.
Small and medium-sized companies targeting unmet medical needs

Vienna based SMEs targeting health care mainly focus on new approaches towards *infectious diseases and cancer*. The following 20 examples highlight current developments and show the multitude of approaches followed by SEMs in Vienna:

- **Accanis**: mRNA based drugs addressing validated molecular targets
- **Activartis Biotech**: cancer immunotherapy for aggressive brain tumor based on dendritic cells
- **Affiris**: antigen specific vaccines for the prevention and treatment of neurodegenerative and cardiometabolic diseases
- **AOP Orphan**: pioneer in rare diseases
- **Apeiron Biologics**: antibody-based therapy to treat patients suffering from neuroblastoma
- **Apeptico**: peptide-based products targeting chronic and life-threatening diseases (e.g. for activating alveolar liquid clearance)
- **Arsanis**: monoclonal antibody based immunotherapies for infectious diseases (S. aureus, RSV)
- **Biomay**: innovative recombinant allergy therapeutics (e.g. grass pollen allergy vaccine; peptide carrier fusion vaccines)
- **Evercyte**: in vitro models and cell-based assays for the production of biopharmaceuticals
- **Haplogen**: antiviral drugs inhibiting host factors instead of viral proteins
- **Hookipa Biotech**: immunotherapy for cancer and infectious diseases (CMV, HPV)
- **Marinomed**: products against respiratory viruses, novel drug delivery technology
- **Nabriva Therapeutics**: novel class of antibiotics
- **Origimm**: vaccine against Propionibacterium acnes (P. acnes) to prevent and treat acne vulgaris and to prevent implant-associated P. acnes infections
- **Panoptes Pharma**: small molecule drugs for eye diseases (e.g. uveitis)
- **S-Target**: therapeutic vaccines to cure and prevent allergic diseases (e.g. house dust mite induced allergic asthma)
- **Themis Bioscience**: Chikungunya and Zika vaccine based on measles virus platform
- **Tube Pharmaceuticals**: potent small molecules to overcome tumor resistance
- **Valneva**: travel vaccines (Japanese Encephalitis, Cholera)
- **Virusure**: virus and prion safety testing of biopharmaceutical products
- **Zytoprotec**: cytoprotective solutions for peritoneal dialysis
Medical conventions and first-class hospitals benefit research

Vienna is ranked among the top convention cities worldwide. Major medical congresses such as the European Congress on Radiology (ECR) are staged in the city each year to foster high-level networking. Such conferences bring about extra benefits for the regional life sciences community and facilitate developing joint research programs. Medical conventions strengthen Vienna as one of Europe’s most important nodes for high-end medicine. Here, 27 hospitals serve Vienna’s 1.8 million inhabitants and the entire Vienna region providing home to 3.7 million people.
In 2015, more than 300 clinical trials have been applied for in Austria as compared to 4,400 in the EU/EEA. Around 70% of the clinical trials in Austria are carried out by the pharmaceutical industry [industry sponsored], 30% are implemented by academic researchers [academic sponsored]. Two thirds of clinical trials are multinational, one third of trials is conducted in Austria only. About half of the clinical trials applied for in Austria are phase III studies. In 2014, the pharmaceutical industry in Austria has reported some 500 ongoing clinical trials, most of them in oncology. Some 6,000 patients have participated in these industry-sponsored trials, thereof some 1,500 in oncology. To promote pediatric studies in Austria, a public-private partnership named OKIDS has been founded in 2013. It serves as a central contact point for sponsors.

When thinking about pharmaceutical companies carrying out R&D or manufacturing in Austria, at least the following five examples need to be kept in mind:

- **Boehringer Ingelheim**: international cancer research center, management of clinical research in 19 countries, growing biopharmaceutical production plant in Vienna, human and veterinary medicines (1,500 employees in Austria)

- **Novartis**: largest pharmaceutical company in Austria, 70 clinical studies ongoing in Austria with around 1,200 participating patients (5,100 employees in Austria)

- **Octapharma**: manufacturing of treatments for patients with coagulation and immune disorders, large manufacturing plant including modern plasma fractionation facility (1,000 employees in Austria)

- **Pfizer**: 20 clinical studies ongoing in Austria, manufacturing of 10 million doses of MenC and TBE vaccines for the global supply (520 employees in Austria)

- **Shire**: global leader on rare diseases and other highly specialized conditions, plasma donation centers, large plasma fractionation and drug production plants (4,200 employees in Austria)

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1 Pharmig, Facts & Figures 2016 – Medicinal Products and Health Care in Austria, p28-32
In 2015, a total of 95 clinical trials on medical devices and in vitro diagnostics have been submitted to the Austrian Federal Office for Safety in Health Care (BASG) in Austria: 43 industry sponsored trials and 52 academic trials. Most of the trials focus on medical devices. 35 products relate to class IIa RL 93/42/EWG. Ottobock and MED-EL are two prominent examples for internationally recognized medical device companies operating growing facilities in Austria. Ottobock produced products worth EUR 114 million in 2015 in Vienna and invested EUR 26 million in R&D on prosthetic limbs, orthotic support and wheelchairs here (535 employees in Vienna). MED-EL is the industry’s technology leader in implantable hearing solutions with headquarters in Innsbruck (950 employees in The Tyrol).

In recent years, the development of diagnostic tools and software based approaches gain in momentum at start-ups and small and medium sized companies. The examples given below show the broad spectrum covered by newly developed approaches:

- **Alphatrace**: digital instruments for neurophysiology
- **Miracor Medical**: cutting-edge solutions for cardiac care
- **mySugr**: app for improving diabetes management
- **Platomics**: digital infrastructure for personalized medicine
- **Piur Imaging**: tomographic ultrasound for vascular imaging
- **TAmiRNA**: mircoRNA biomarkers for serious age-related illnesses

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Cutting-edge facilities have become a prerequisite for excellence in life science research. The Austrian Federal Government and the city of Vienna invest a total of 52 million euros in first-class scientific infrastructure run by Vienna BioCenter Core Facilities GmbH (VBCF) until 2020. The shared core facilities serve academic institutes and the vibrant start-up community at VBC and beyond. More than 1,400 employees and 700 students from three universities conduct research or work at this leading international life science research center. Around 30 enterprises and scientific institutions use the 90,000 m² of modern office and lab space.

The city will also invest another 10 million euros in special purpose machines and technology run by EQ-BOKU-VIBT GmbH at the life science center Muthgasse over a 10-year period. At BOKU’s campus at Muthgasse, the university joins forces with AIT, ACIB and the FH Campus Wien to carry out top-notch applied biotechnology research. Some ten start-up companies profit from the extensive know-how and top lab space available here.

To bring early stage development of innovative small molecule and biologic drug candidates for human diseases to the next level, wings4innovation has been initiated as an independent translational research center by 17 Austrian academic research institutions. This one-stop-shop will significantly accelerate the creation of commercially valuable assets based on breakthrough results in basic research.