



Leuven, life sciences pearl

Fostering high-tech entrepreneurship in the heart of Europe



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Leuven, a region for innovation & high-tech entrepreneurship

Key ingredients for innovation

Leuven is situated in the heart of Belgium and Europe, only 25 kilometres from Brussels, the European capital. The city of Leuven has a long tradition of international high-tech business development and plays a leading role in the European knowledge economy. It provides the key ingredients for innovation and high-tech entrepreneurship:

- cutting-edge science & technologies;
- a long tradition of technology transfer;
- an innovative business climate with many high-tech companies and state-of-the-art incubators & science parks;
- investment capital;
- people & networking opportunities;
- a network of international affiliations and partnerships.

Renowned knowledge institutes

The **KU Leuven Association**, including **University Hospitals Leuven**, is consistently ranked among Europe's top 20 academic research centres and is continually working to enhance and reinforce this position. The network of university hospitals, which together make up University Hospitals Leuven, enrich the Leuven region with one of Europe's most modern and dynamic healthcare infrastructures.

The role of the KU Leuven Association in the Leuven knowledge economy region is closely linked to the achievements of the nanoelectronics research institute, **imec**. Imec performs world-leading research in nanoelectronics and maintains global partnerships in ICT, healthcare and energy.

Furthermore, several departments of **iMinds** and the **Flemish Interuniversity Institute for Biotechnology (VIB)** are also located in Leuven. The KU Leuven Association, the Leuven-based VIB and iMinds departments, and imec have a combined R&D budget of € 750 million and employ about 22,500 people, 8,000 of whom are researchers. [www.imec.be - www.vib.be - www.uzleuven.be - www.kuleuven.be/iminds]

Hundreds of high-tech companies

Leuven's knowledge institutes provide fertile ground for innovation and high-tech entrepreneurship. They also generate a huge inflow of state-of-the-art knowledge that brings with it a myriad of innovative ideas for new and existing companies. This favourable climate for knowledge-driven entrepreneurship and innovation makes the Leuven



region an attractive location for many high-tech companies. Most of the 140 KU Leuven and imec spin-off companies are located in or around Leuven. Approximately 300 high-tech companies have set up operations in the Leuven region.

Significant investment capital

A large amount of investment capital is available to support and stimulate innovative entrepreneurship, either via venture capital groups or via university funds such as the Gemma Frisius Fund, a seed capital fund established by KU Leuven and two private equity banks. In addition, Capital-E is a venture capital fund linked to imec. The Leuven region is also home to several venture capital firms managing funds such as the Capricorn funds and the Quest for Growth fund. [www.capricorn.be - www.questforgrowth.com]

A long tradition of technology transfer

KU Leuven Research & Development (LRD) was established in 1972 as one of the first technology transfer offices in Europe. Over the years, LRD has developed a tradition of collaborating with industry, securing and licensing intellectual property rights, and creating spin-off companies. LRD is dedicated to building bridges between science and industry, and to transferring knowledge and technologies to the marketplace. [ird.kuleuven.be/en]

State-of-the-art lab and office space

Several incubators, science parks and business centres in the Leuven region provide state-of-the-art lab and office space for innovative spin-off companies as well as international research-intensive companies. Together, they constitute a technology belt around the city of Leuven. The **Haasrode Science Park**, with a total area of 136 hectares, accommodates tens of high-technology businesses, employing approximately 5,000 people in total. The **Arenberg Science Park**, with an area of 13 hectares, was opened in 2004. This science park, situated close to imec, consists of four clusters, of which two focus on biotechnology and two on ICT and other high-tech sectors.



A third science park, **Leuven Noord**, will be developed by 2017. The **Leuven Bio-incubator** offers multifunctional ventilated office and L3 lab space as well as general and technical, logistical and environment-technical support to R&D intensive biotech companies. The Leuven Bio-incubator covers 62 modules ranging from 125 to 250 m² that can be modified on a tailor-made basis. The **KU Leuven Innovation and Incubation Centre** (I&I) provides shared facilities, equipment and services to young businesses. [www.bio-incubator.be – www.wetenschapspark-arenberg.be/en]

Highly educated employees and easily accessible

The Leuven region has a **large talent pool** of highly educated, multilingual and flexible employees. It is easily accessible, within close proximity to major motorways and only a 15-minute drive from Brussels International Airport. By train, it takes only 13 minutes to reach the airport thanks to a direct railway connection. The Antwerp harbour, the second largest port in Europe, is only an hour from Leuven by car. In addition, Leuven has plenty of seminar and conference facilities, and offers a broad range of hotel accommodation.

Network organisations and technology platforms

The Leuven Innovation Networking Circle, **Leuven.Inc**, stimulates high-tech entrepreneurship by bringing together like-minded people from academic research groups, high-tech start-ups, consulting agencies, venture capitalist firms, and well-established companies in the Leuven region. In addition to this horizontal network, several specialised technology platforms are in place. **DSP Valley** focuses on the design of hardware and software technology for digital signal processing systems. **LSEC** is dedicated to creating IT security awareness in the industry at large. The **Centre for Drug Design and Discovery** (CD3) aims to discover new drugs. **Neuroelectronics Research Flanders** (NERF) focuses on unravelling the neuronal circuitry of the human brain. The **Leuven Medical Technology Centre** (L-MTC) has developed expert skills in medical imaging, healthcare automation, biomaterials and tissue regeneration, biomonitoring and biocontrol. The **Leuven Materials**

Research Centre (Leuven-MRC) monitors and coordinates research on materials development. The **Leuven Food Science and Food Research Centre** (LFoRCe) conducts ground-breaking research on the relationship between food and health. **PharmAbs** focuses on generating tailor-made monoclonal antibodies. The **Leuven Centre on Information and Communication Technology** (LICT) combines the expertise of electronics engineers, computer scientists and sociologists in the ICT field. In addition, the **Vlaams-Brabant Innovation Centre** aims to support innovation in SMEs. [www.leuveninc.be - www.dspvalley.com - www.lsec.be - ird.kuleuven.be/en/tc]

Internationally oriented

With **154 nationalities** working, studying and living in Leuven, the city has a distinctly international flavour. International schools, housing and relocation agencies, network organisations, sports clubs, hospitals and city administration all take special care to support and serve the international community of the Leuven region. As Belgium is a multi-linguistic country and is home to the staffs of the European institutions and their families, facilitating families from around the world is an embedded part of the culture. The university's 7,200 international students accentuate Leuven's diverse character.



Cross-border cooperation

A strong and dynamic triple helix cooperation between industry, knowledge institutes and government has led to a very favourable entrepreneurial climate. The city of Leuven and the province of Vlaams-Brabant collaborate closely on regional development. Together with the knowledge economy regions of Eindhoven (The Netherlands) and Aachen (Germany), Leuven forms a strong cross-border network, **ELAt** (Eindhoven – Leuven – Aachen triangle). ELAt is one of the top European technological regions, promoting a knowledge economy via cross-border and interregional cooperation. Together with the biomedical clusters of

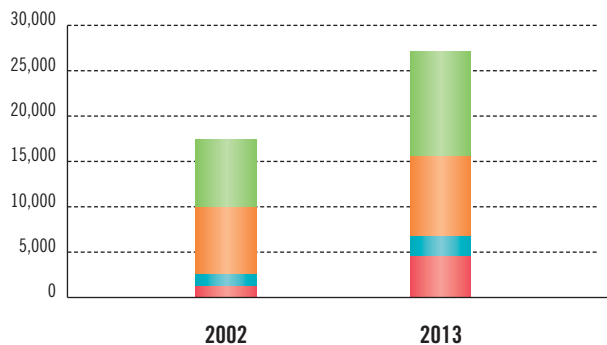
Cambridge (UK) and Heidelberg (Germany), Leuven has formed the **Health Axis Europe** alliance to foster health innovation across Europe. Health Axis Europe promotes collaboration in the areas of regenerative medicine, stem cell research, medical devices and personalised medicine with a focus on research, development and education as well as on procuring financial support, particularly from within the funding structures of the European Union. Recently, Leuven joined the **Community of Ariane Cities**, which aims to strengthen the cooperation between cities and industrial organisations involved in European space transportation programmes. [www.elat.org - www.health-axis.eu - www.ariane-cities.com]



Leuven, a dynamic and fast-growing region

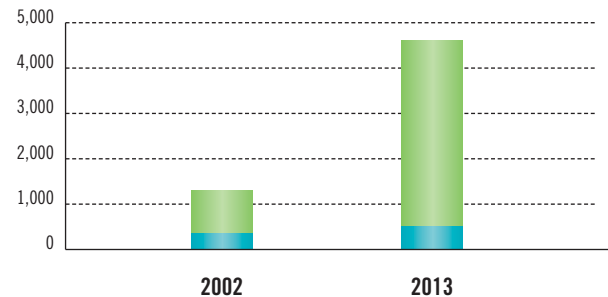
Leuven's strong focus on the creation of knowledge and technology has led to a rapid increase in innovation and high-tech entrepreneurship. Leuven is a dynamic, fast-growing region, with great potential for R&D and high-tech business development. Leuven's knowledge institutes have a considerable impact on local economic growth, now as well as in the future. Leuven offers the unique combination of an international character, a track record in state-of-the-art technology innovation and access to the biggest consumer region in Europe.

Employment



- KU Leuven
- University Hospitals Leuven
- imec
- Spin-off companies KU Leuven & imec

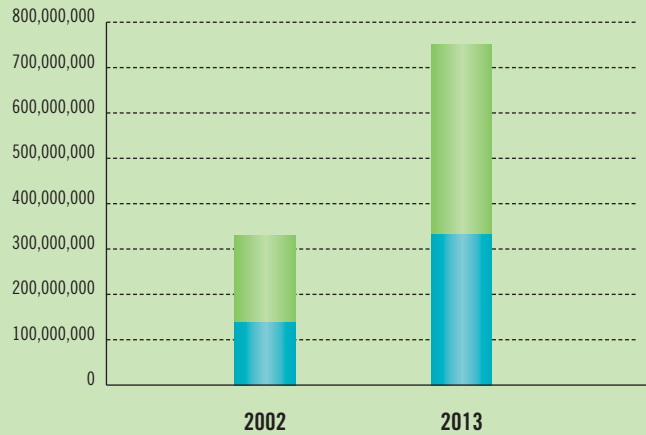
Employment spin-off companies



- KU Leuven
- imec

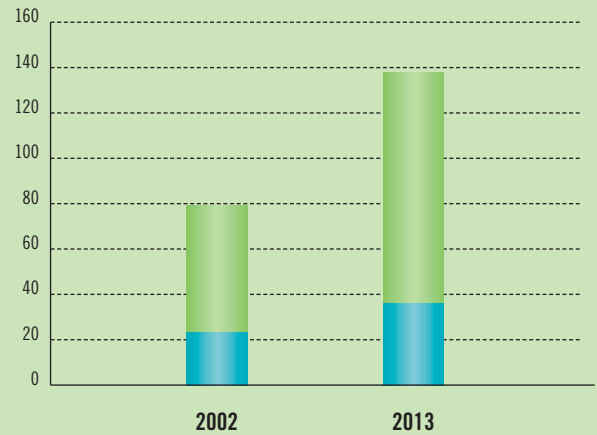


R&D budget (in euro)



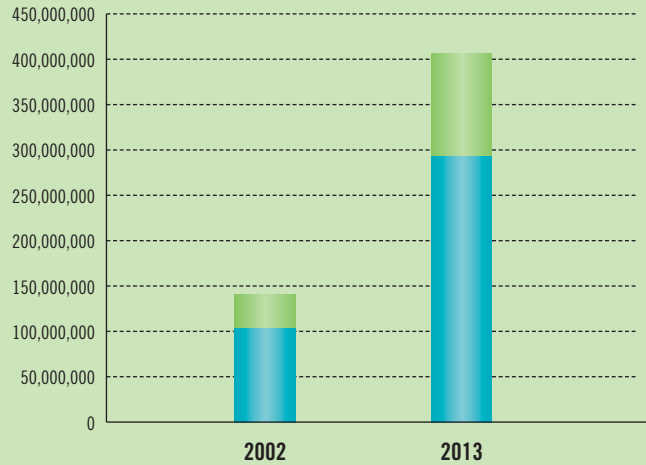
■ KU Leuven
■ imec

Number of spin-off companies



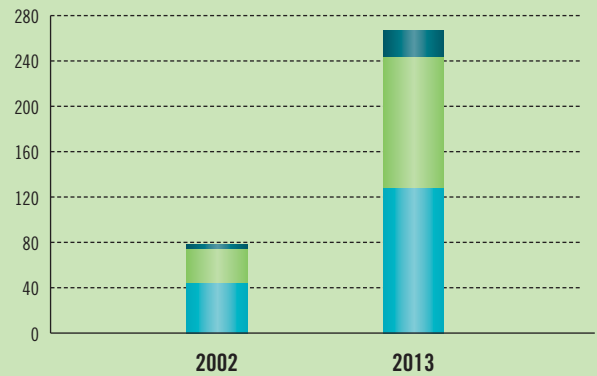
■ KU Leuven
■ imec

Income from research collaboration (in euro)



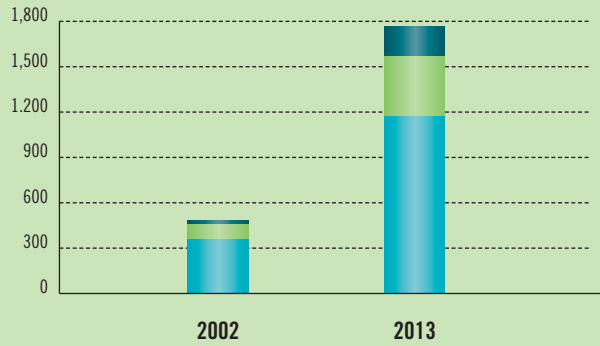
■ KU Leuven
■ imec

Number of patent applications



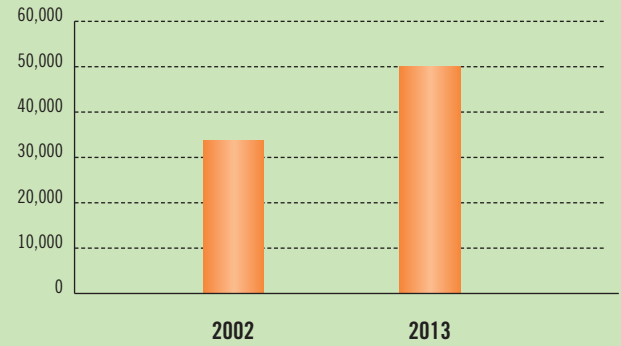
■ KU Leuven & imec (joint)
■ KU Leuven
■ imec

Number of active patent families



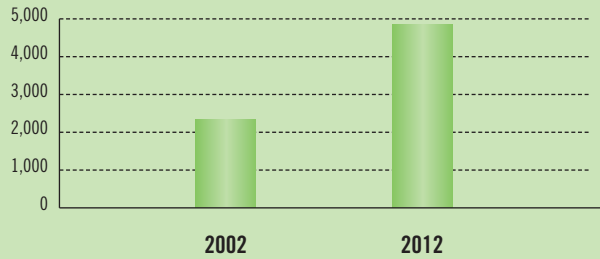
- KU Leuven & imec (joint)
- KU Leuven
- imec

Number of university and university college students in Leuven



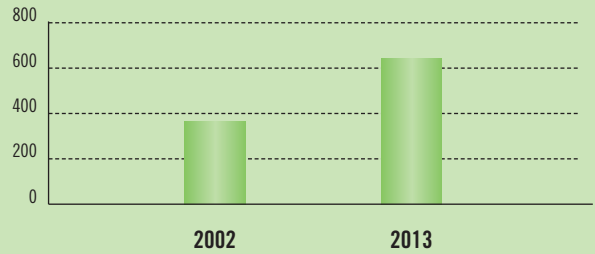
- KU Leuven, Groep T & KHLeuven

Number of international publications in science journals



- KU Leuven

Number of PhD degrees at KU Leuven



- KU Leuven

Leuven, research for a better world

The world's leading anti-HIV drug

Leuven has a long tradition of developing innovative and effective medications. One such medication is the antiviral agent tenofovir disoproxil fumarate, discovered in 1993 by Professor Erik De Clercq and Professor Jan Balzarini of the KU Leuven Rega Institute for Medical Research, in collaboration with Professor Antonin Holý of the IOCB in Prague and Dr. John Martin of Gilead Sciences. Tenofovir was licensed to the American biopharmaceutical company Gilead Sciences, which further developed it and now produces and distributes the drug under the trade name Viread® in exchange for royalty payments to KU Leuven. Tenofovir is also an essential component of the combination drugs Truvada®, Atripla®, Complera® and Stribild®, and has become the most

commonly used anti-HIV drug in the world. In 2013, sales of Truvada® and Atripla® each totaled over \$3 billion, while sales of Viread® reached about \$950 million. Drugs containing tenofovir are effective at reducing the HIV-titre in the blood, so that HIV-infected

patients treated with these medications can manage the disease for many years. The discovery of the phosphonates, the class of compounds to which tenofovir belongs, has also contributed to the creation of the KU Leuven spin-off company Okapi Sciences, which specialises in the development of drugs for the treatment or prevention of viral infections in animals, such as swine fever and foot-and-mouth disease. In 2014, Okapi Sciences was acquired by Aratana Therapeutics.



Medication for the prevention of heart attacks and strokes

In 1979, Professor Désiré Collen of the Faculty of Medicine isolated and characterised tissue plasminogen activator (tPA), a key protein involved in the breakdown of blood clots. Administered as a medication, tPA prevents heart attacks and strokes, and has saved numerous lives. Millions of patients have been treated with this medication. tPA was first licensed to the American biotech company Genentech, and is now produced and distributed under the name Actilyse® by Boehringer Ingelheim.



Refined cochlear implants

The Australian company Cochlear, a global leader in implantable hearing solutions, collaborates closely with several partners in the Leuven region. KU Leuven and imec, together with the spin-off companies Easics, ICsense and AnSem, and the multinational company NXP Semiconductors have all contributed to refining cochlear implants. KU Leuven and Cochlear have partnered for more than ten years. Cochlear develops hearing implants that use electrical stimulation, known as cochlear implants (CIs), which consist of two parts: a surgically implanted component that electrically stimulates the auditory nerve, and a speech processor worn externally that receives the sound and converts it into a pulsed electrical code. This code is sent through a wireless radiofrequency (RF) connection to the internal implant, which then stimulates the auditory nerve. Using a CI, profoundly deaf people can perceive sounds and can even understand speech under favourable conditions.

At KU Leuven, Professor Jan Wouters of the Division of Experimental Otorhinolaryngology and Professor Marc Moonen of the SCD Division of the KU Leuven Department of Electrical Engineering are working with Cochlear to improve the performance of CIs. Specifically, the research is focused on developing software to process auditory signals in order to filter out noise so that CI users can perceive speech and music more easily. Researchers are also looking for new methods for auditory nerve stimulation, development of test platforms, and ways to improve perception of the direction from which an auditory signal is coming.

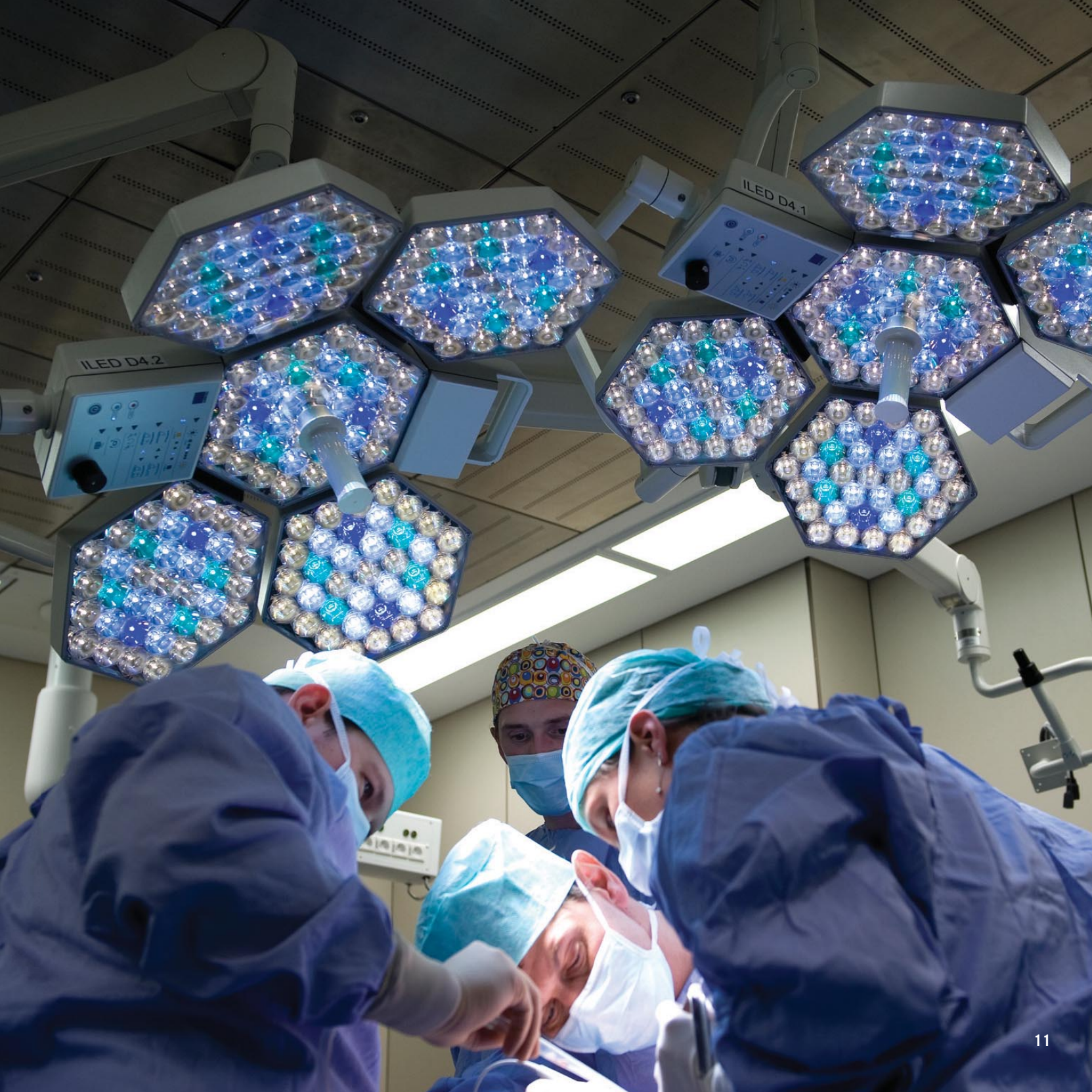


NXP Semiconductors, whose Personal Health division is headquartered in Leuven, develops and manufactures powerful, low-energy logic chips for cochlear implants, allowing for smaller batteries and less visible speech processors. Cochlear Australia and ICsense have developed circuits that stimulate the auditory nerve. Easics has reduced the energy consumption of the speech processor by dividing functionalities into several smaller tasks that are only activated when necessary. Imec, together with Cochlear, has optimised the layout of the chip and manufactures both the prototypes of the chip and the end product. AnSem develops circuits that control the electrical charge inside cochlear implants. Taken together, these innovations all contribute to the next generation of refined cochlear implants. 250,000 people have gained hearing thanks to cochlear implants. [www.cochlear.com - www.easics.com – www.ansem.com – www.icsense.com – www.nxp.com]

The world's first patient-specific lower jaw

LayerWise is a KU Leuven spin-off company that specialises in Additive Manufacturing (AM), a technology developed to build up materials in layers. This technology was used to produce the world's first patient-specific titanium lower jaw implant, developed in collaboration with project partners from the medical industry and academia. The tailor-made jaw implant was successfully used to treat near-total progressive osteomyelitis in the lower jawbone of an elderly patient. To start, AM technology specialists at LayerWise used a 3D printer to create the complex implant design, which incorporates articulated joints and dedicated features. The reconstruction – postprocessed with dental suprastructure provisions, polished joint surfaces and a bioceramic coating – was implanted successfully into the patient, where it restored her facial aesthetics and allowed her to regain her speech within hours. The dental division of LayerWise, called DentWise, also restored the teeth of the patient, by manufacturing a dental prostheses that was screwed into the titanium jawbone implant after a healing period. In 2014, LayerWise was acquired by 3D Systems. [www.layerwise.com]





ILED D4.2

ILED D4.1

Leuven, a dynamic life sciences cluster

Top-ranking, modern hospitals

University Hospitals Leuven, the multi-campus network of university research hospitals, has a total of 2,000 beds and 9,000 employees. It is among the most modern and well-equipped hospitals in Europe and is accredited by the Joint Commission International (JCI). The university hospitals are embedded in a Health Sciences Campus, where education, advanced research and medical care are brought together in one single location, facilitating a strong cross-fertilisation between research and patient care. Currently, the campus is home to 1,300 researchers. 10,000 students attend classes there. [www.uzleuven.be/en]

High quality patient care

University Hospitals Leuven has rolled out an integrated IT system to electronically manage patient files. The system optimizes the follow-up of patients, informs the medical team that takes care of the patient and assures quality and safety throughout the medical care process. As a result of a medical joint venture with other Flemish hospitals, called 'nexuz health', the IT system of the University Hospitals Leuven is being used by 15 hospitals. These hospital partners can work closely together using one and the same patient file. [www.nexuzhealth.be/en]

A long-standing experience

Leuven has a long tradition in the development of revolutionary medication. In 1979, KU Leuven researchers discovered tPA, a protein involved in the breakdown of blood clots. By preventing coronaries and strokes, tPA has saved the lives of ten thousands of people. Millions of patients have been treated with this medication. Viread, another revolutionary drug, was discovered in 1993 as an anti-HIV agent and still is the most commonly used anti-HIV drug in the world. [www.viread.com]

Clinical excellence

Belgium has the highest number of clinical trials per capita in the world. The country's large talent pool of highly skilled research staff and excellent infrastructure make Belgium particularly suited for collecting and analysing clinical trial data. It is no surprise that many leading pharmaceutical companies carry out clinical trials in Belgium. At two weeks for Phase I studies, Belgium has the fastest approval procedure in Europe. KU Leuven also plays a leading role in these clinical trials by coordinating them via the university hospitals' Clinical Trial Centre.

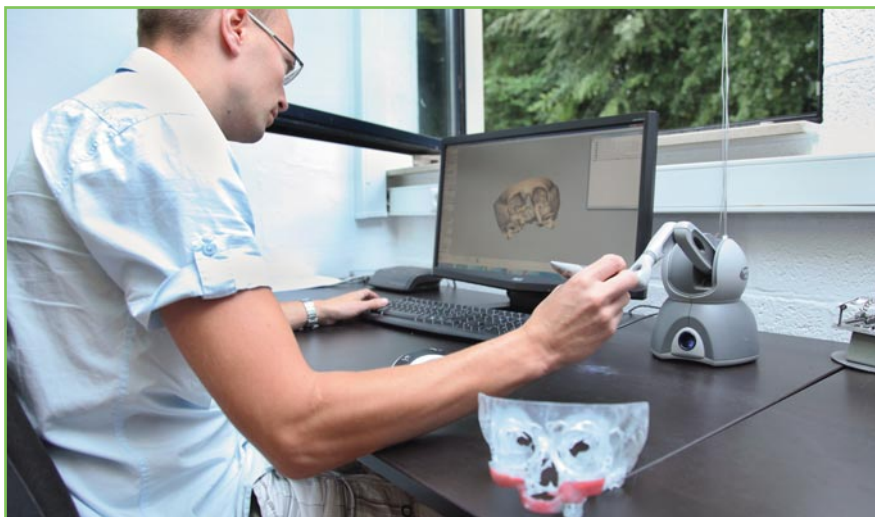
Translational research

In 2006, the Flemish universities and university hospitals, the health care

industry in Flanders and the Flemish Government established the Centre for Medical Innovation (CMI). CMI is headquartered in Leuven and aims to accelerate the translation of innovation in human health care into novel clinical applications. CMI's first project is the creation and coordination of the Flemish Biobank, a virtual biobank in specific disease fields, according to strict quality criteria for biomaterials and accompanying clinical data sets. [www.cmi-vzw.be]

A unique technology transfer platform for drug development

The Centre for Drug Design and Discovery, CD3, is a unique technology transfer platform created by KU Leuven with the investment support of the European Investment Fund. CD3 aims to discover new drugs and develop them to a stage where pharmaceutical and biotech companies are interested in either licensing the technologies developed or in undertaking collaborations with the project partners. Potential new medicines can also form the basis for spin-off companies. Via CD3, KU Leuven has taken the initial steps in the development of new medications for a number of conditions, such as AIDS, hepatitis C, cancer, arthritis, asthma, Dengue virus infections, epilepsy and Alzheimer's disease. [www.cd3.be]



Highly acclaimed researchers

KU Leuven is home to many prominent researchers of international acclaim. Désiré Collen, Erik De Clercq, Peter Carmeliet, Bart De Strooper and Catherine Verfaillie are world-renowned researchers who conduct pioneering research on cardiovascular disease, virology, blood vessel formation, Alzheimer's disease and stem cells, respectively.

World-class international companies and spin-offs

KU Leuven's long and successful track record in health research has resulted in the creation of numerous spin-off companies with global appeal, such as ThromboGenics, Cartagenia, LayerWise, Okapi Sciences and reMYND. In 2012, the U.S. Food and Drug Administration (FDA) approved ThromboGenics' core product, JETREA®, for the treatment of symptomatic vitreomacular adhesion.

Cartagenia delivers diagnostic software and database systems that enable genetics labs to perform genetic analyses quickly and efficiently. LayerWise specialises in metal Additive Manufacturing for medical applications, while reMYND is a biopharmaceutical company that develops disease-modifying treatments against diabetes, Alzheimer's and Parkinson's disease. Large international biomedical companies such as Terumo Europe, IDT, Aratana Therapeutics and VWR International have also established operations in the Leuven region.

Tailor-made infrastructure

Leuven offers excellent facilities for life sciences businesses. The Leuven Bio-incubator provides an innovative, dynamic and stimulating environment in which entrepreneurs and companies active in the field of biotechnology can develop their ideas and technologies.

Its location makes it the ideal base of operations for businesses with European interests. The Leuven Bio-incubator covers 62 modules ranging from 125 to 250 m² with a total of 9375 m² of state-of-the-art laboratory and office facilities. Another incubator, the Biogenerator, is the main feature of the 'Feed Food Health' campus. The Feed Food Health project focuses on functional food for animals and people, health and quality of life. [www.ffhtienen.be – www.bio-incubator.be]

Collaboration with global industry

KU Leuven collaborates with several global players in the pharmaceutical and healthcare industries, such as UCB, Janssen Pharmaceutica, Johnson & Johnson, GSK and Pfizer. Imec works together with companies such as Pacific Biosciences, Johns Hopkins and Philips. For many years, KU Leuven and imec have been providing their R&D expertise to the Australian company Cochlear, which develops cochlear implants for hearing impaired people.

Interdisciplinary research

KU Leuven encourages interdisciplinary research that crosses the borders of departments and faculties. The Leuven Medical Technology Centre (L-MTC) is a case in point. L-MTC incorporates 41 different research groups in engineering and biomedical sciences and brings together over 700 researchers and professors. L-MTC has developed expert skills in medical imaging, bionic systems, healthcare automation, biomaterials and tissue regeneration, biomonitoring, and biocontrol.

In addition, and specifically for medical imaging, over 100 engineers, physicians and physicists are brought together in the Medical Imaging Research Center, a state-of-the-art multidisciplinary facility in the middle of the Health Sciences Campus. Other interdisciplinary research centres focus on neurodegenerative disorders, cancer, stem cells and bioinformatics, respectively. [mirc.uzleuven.be/LMTC - www.kuleuven.be/samenwerking/lind - www.uzleuven.be/lki - mirc.uzleuven.be/MedicalImagingCenter]

Advanced research on nutrition and health

LForCe, the Leuven Food Science and Nutrition Research Centre, was established by KU Leuven to focus on the relation between nutrition and health. It is a multidisciplinary research centre with a wide expertise in food technology, biomedical research and social sciences. The activities of LForCe have resulted in several collaborations with local and international companies, as well as in the creation of the spin-off company, Fugeia, which focuses on digestive health. Kellogg's stimulates fundamental research at KU Leuven through the W.K. Kellogg Chair in Cereal Science and Nutrition. [www.lforce.kuleuven.be]

Strong in bioelectronics

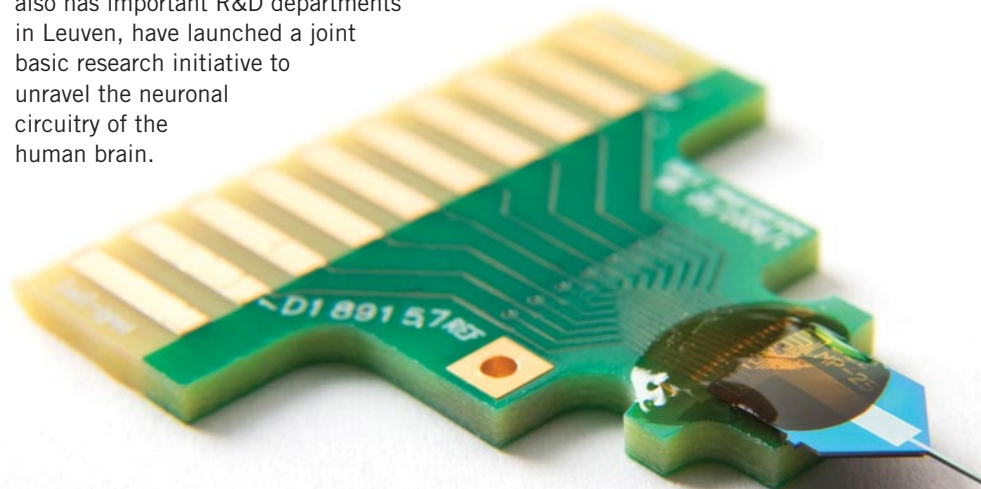
Imec develops solutions for future cost-effective and reliable healthcare. Imec works on platforms to advance life sciences and on wearable sensors for monitoring and diagnostics.

The next-generation platforms that imec builds allow for intelligent, high-content screening and culturing of cells and biomolecules. These platforms support pharmaceutical research, but also serve as the basis for future applications for diagnosis and long-term therapy. At the heart of these systems are bio-nano interfaces, which are interfaces between biological material and electronics that allow a fine-grained two-way communication. Imec and Holst Centre collaborate on technology for wearable and implantable body area networks. These include sensors that continuously register and interpret health parameters, and actuators that e.g. administer drugs. Such networks have to be wirelessly connected, extremely reliable, low-power, and comfortable to wear. [www.imec.be]

Advanced research on neuroelectronics

Imec, KU Leuven and VIB, Flanders' leading life sciences institute which also has important R&D departments in Leuven, have launched a joint basic research initiative to unravel the neuronal circuitry of the human brain.

The initiative, Neuroelectronics Research Flanders (NERF), is supported by the Flemish government and investigates fundamental neuroscientific questions through collaborative, interdisciplinary research combining nanoelectronics with neurobiology. NERF provides vital knowledge for the pharmaceutical and medical industries and is crucial for the study of pathologies such as Parkinson's disease, Alzheimer's disease and psychiatric disorders. NERF is located at the imec campus, where researchers work in interdisciplinary teams, thus benefitting from imec's state-of-the-art cleanroom infrastructure and the new 1,000 m² neurolab. NERF has six research teams (including one visiting team), totalling over 40 experts from 17 nationalities.



KU Leuven Research & Development, a long tradition of technology transfer

KU Leuven Research & Development (LRD) was established in 1972 as one of the first technology transfer offices in Europe. Today, LRD consists of a multidisciplinary team of over 80 experts who guide researchers in their interactions with industry and society, and provide support for the exploitation of their research results.

LRD sets up all **research collaboration agreements** between the KU Leuven Association and industry, varying from small consulting assignments commissioned by a company to long term research projects. LRD also manages the commercialisation of the **intellectual property** of KU Leuven and the associated university colleges. This requires adequate protection and an appropriate transfer strategy to ensure that innovation from research finds its way into society.

In addition, LRD stimulates the creation of **spin-off companies** by giving entrepreneurs the appropriate guidance and access to **incubation & seed financing**. Over 100 high-tech companies have been created thus far, directly employing more than 4,000 people. Finally, LRD actively cultivates a favourable climate for **knowledge-driven entrepreneurship and innovation** in the Leuven region.

Within the university structure, a unique decision and incentive mechanism has been implemented. Researchers can form LRD research divisions, through which they can manage their technology transfer activities in an autonomous but supported way, and foster innovation and entrepreneurship in combination with high-level research and education. These LRD research divisions stimulate interdisciplinary collaborations by allowing researchers to cooperate across the boundaries of departments and faculties.



Health Sciences Campus in expansion

KU Leuven's Health Sciences Campus brings together education, R&D and medical care in one single location. Over a period of ten years, €800 million is invested in the university hospital campus, doubling the campus's surface. All KU Leuven life sciences departments are centralized on this campus, boosting academic research and translational medicine. The Health Sciences Campus allows University Hospitals Leuven to offer the highest standard of medical care and to strengthen its leading position in Europe.

The project comprises the construction of a psychiatric hospital and a new critical care department consisting of an emergency room, a new operating room and an intensive care unit. It also includes new teaching facilities, an expansion of the oncology department, a children's psychiatry department, a day care centre, a hotel and an indoor boulevard connecting the different areas of the campus.

Today, 10,000 students attend classes at the university hospital campus and 40,000 people visit the site on a daily basis. [www.uzleuven.be/en]





KU LEUVEN

**UZ
LEUVEN**

Imec campus keeps expanding

In 2014, imec celebrated its 30th year. This coincided with the official opening of the new 16-floor office building, which provides office space for up to 450 people. At the same time, imec started building a new cleanroom. This new heart for chip R&D will have 4,000m² available for the most advanced tools of the world's major semiconductor suppliers. Once in operation, starting 2016, it will form one extended cleanroom with the existing 300mm (450mm-ready) facility.

In this cleanroom, researchers from imec will collaborate with experts from chip producers and material and tool suppliers. They will fine-tune the process steps to fabricate the next generations of transistors, the smallest building blocks of a chip. These new generations will have critical dimensions below 10nm and use new materials and architectures. Quite a challenge for the semiconductor industry.

These expansions put imec on a par with the world's foremost high-tech nanoelectronics research centers. With this infrastructure, imec aims to contribute significantly to the growth of the Flemish high-tech economy. [www.imec.be]



VIB, Flanders' life sciences research institute

VIB is an excellence-driven life sciences research institute in Flanders, Belgium. VIB aims to push the limits of our understanding of molecular mechanisms of life and disease, and provides a stimulating environment to its scientists. VIB unites the expertise of 1400 scientists, originating from over 60 countries, in a single institute.

Since its inception, VIB is also an entrepreneurial biotechnology catalyst focusing on translating basic scientific breakthroughs into pharmaceutical, agricultural and industrial applications. In this context, VIB pro-actively translates biological insights into proof-of-concept stage assets which can be the basis for active partnering with industrial players or the launch of new venture capital-backed biotechnology companies.

VIB also actively engages in the public debate on biotechnology by developing and disseminating a wide range of science-based information about all aspects of biotechnology. VIB has a close partnership with four Flemish universities - Ghent University, KU Leuven, University of Antwerp and Vrije Universiteit Brussel. [www.vib.be]



iMinds, Flanders' digital research center

iMinds is Flanders' digital research center and business incubator, established by the Flemish Government in 2004. Building on the strength of over 850 top researchers located at 5 Flemish universities, iMinds introduces digital innovation in six key markets: ICT, Media, Health, Energy, Smart Cities and Manufacturing.

Research within Leuven's iMinds Medical Information Technologies Department concentrates on algorithms and tools for improved analysis and decision-making, in particular for medical applications. The department's imaging and big data research not only serves the medical imaging and life sciences industries, but is also increasingly being applied in other industries.

The iMinds Medical Information Technologies Department aims to innovate the health care sector by clustering the expertise of approximately 200 researchers in bio-informatics, data mining, biomedical signal processing, medical imaging and advanced image computing. [www.kuleuven.be/iminds/medicalit]



Life sciences in Leuven



- Knowledge centres
- Centres of excellence
- Purely innovative companies
- Mixed innovative companies

Medical technologies experience center

In the spring of 2016, the city of Leuven, iMinds and KU Leuven will open **Leuven Health House**, a medical technologies experience center for health care professionals, policy makers and the general public. Leuven Health House wants to demonstrate the growing impact of technology in medicine and health care, by showcasing Leuven's topnotch medical research results and technological achievements. The experience center will have a meet & greet room, an auditorium and an interactive and customizable 650 m² show room with multimedia panel displays and 360 degree views.

Leuven, a dense network of life sciences companies



IPO: July 2006 (founded: 1991)
HQ: Leuven, Belgium

**Offices: New Jersey (US),
 Dublin (Ireland)**

Staff: >100

**Milestones: Regulatory approval
 and commercialization of JETREA®
 (ocriplasmin), THR on NYSE
 Euronext Brussels**

www.thrombogenics.com

**ThromboGenics is dedicated to developing
 and commercializing new treatments that
 address unmet clinical needs in
 ophthalmology and oncology.**

Company Profile

ThromboGenics is an integrated biopharmaceutical company focused on developing and commercializing innovative ophthalmic and oncology therapies. The company's lead drug, JETREA® (ocriplasmin), is approved for symptomatic vitreomacular adhesion (VMA) / vitreomacular traction (VMT). JETREA® was approved by the US FDA in October 2012 for the treatment of symptomatic vitreomacular adhesion (VMA) and launched in January 2013. In March 2012, ThromboGenics signed a strategic partnership with Alcon / Novartis for the commercialization of JETREA® outside the United States.

In Europe, JETREA® is approved for the treatment of vitreomacular traction (VMT), including when associated with macular hole of diameter less than or equal to 400 microns.

Strategic Focus

ThromboGenics is strategically focused on maximizing the global opportunity for JETREA® by:

- Commercializing JETREA® in the US via its own commercial organization.
- Supporting Alcon's commercialization of JETREA® outside the US.
- Further developing its JETREA® franchise via new formulations and indications. The prevention of Proliferative Diabetic Retinopathy (PDR) is the next target indication for JETREA®, with the aim of offering a more simple and early-stage therapeutic solution and possible prevention of PDR.

- Accessing novel ophthalmic medicines to expand ThromboGenics' ophthalmology franchise with a focus on diabetes – sourced via own research, joint development/licensing deals and possibly acquisitions:
 - ThromboGenics entered into a collaboration and license agreement with Bicycle Therapeutics to develop and commercialize novel drugs inhibiting a specific target for the treatment of diabetic macular edema (DME).
 - ThromboGenics will work together with Eleven Biotherapeutics to develop recombinant protein therapeutics that can modulate a pathway in diabetic eye diseases.
 - ThromboGenics is also further exploring anti-PIGF (Placental Growth Factor), also referred to as TB-403, for the treatment of ophthalmology and oncology indications.

Clinical Ophthalmology Pipeline

Drug Candidate	Target Indication	POC	Clinical			GO
			Phase I	Phase II	Phase III	
JETREA® Ocriplasmin	Symptomatic VMA/ VMT	██████████	██████████	██████████	██████████	██████████
	Diabetic Eye Disease	██████████	██████████	██████████	██████████	██████████
Bicycle Ther.	Diabetic Eye Disease: DR, DME	██████████	██████████	██████████	██████████	██████████
Eleven Bioth.	Diabetic Eye Disease: DR, DME	██████████	██████████	██████████	██████████	██████████
TB-403 [anti-PIGF]	Ophthalmology	██████████	██████████	██████████	██████████	██████████
TB-403 [anti-PIGF]	Oncology (medulloblastoma)	██████████	██████████	██████████	██████████	██████████



Founded: 2002

HQ: Leuven, Belgium

Offices: 1

Staff: 40

www.remynd.com

reMYND, founded in 2002 as a KU Leuven spin-off, drives the development of innovative therapeutics targeting the protein-misfolding disorders diabetes, Alzheimer's disease (AD), Parkinson's disease (PD) and orphan disorders, through two independently managed business units:

- The Drug Discovery and Development Unit (DDD) focuses on disease-modifying treatments targeting toxic protein misfolding of e.g. pro-insulin, tau, α -synuclein and Huntington.
- The in-vivo Contract Research Organization (CRO) is a world-class service provider helping its clients to



understand the therapeutic in-vivo effects of all types of experimental Alzheimer treatments.

Drug Discovery and Development

reMYND's DDD unit is committed to discover and develop disease modifying therapeutics for treatment of patients suffering from protein-misfolding disorders comprising different disease areas such as diabetes, AD, PD, Huntington, ALS and Cystic Fibrosis.

reMYND's treatments aim to decelerate the cellular degeneration in patients.

As such, reMYND responds to a major unmet medical need, as all marketed treatments and the majority of the products under development worldwide are aimed to only mitigate symptoms in the respective disorders.

reMYND's current lead compounds in diabetes and AD even reverse the disease and re-functionalise the pancreas and neurons, respectively.

Currently a rich pipeline of products is being pursued (below).

Contract research

reMYND's CRO is a trusted research partner in helping its clients to evaluate the pharmacokinetics and -dynamics of their experimental AD treatments using its proprietary mouse models of the disease.

By contributing its extensive expertise, reMYND has helped 7 of the top 10 pharma's world-wide and provided the pivotal in-vivo data for many of the experimental AD treatments currently in clinical development.

		Discovery			Pre-clinical development			Clinical development		
		Assay development	Hit Identification	Lead optimisation	PoC in animals	Developability	Ph.I enabling studies	Phase I	Phase II	Phase III
Alzheimer	ReS19-T									
	ReS3-T									
	ReS8-T									
	ReS10-T									
Diabetes	ReS39-I									
	ReS13-I									
Parkinson	ReS9-S									
	ReS12-S									
Orphan	Huntington									
	ALS									
	CF									

Founded: October 2006

HQ: Leuven, Belgium

Fund capital: € 24 million

**Milestones: Exclusive licenses
with Pfizer, Janssen,
AstraZeneca and Novartis**

www.cd3.be

CD3 discovers new small molecule drugs in order to bridge the gap between innovative biomedical research emerging from academic institutions or SMEs and the pharmaceutical industry.

The Centre for Drug Design and Discovery (CD3) is a technology transfer platform and investment fund in the field of small molecule drug discovery and target validation, created by KU Leuven Research & Development and the European Investment Fund. CD3 focuses on the discovery of new and innovative small molecule drugs in collaboration with academic research groups or small (spin-off) companies by delivering financial means in combination with expert drug discovery support.

CD3 aims to develop potential new medicines to a stage where the pharmaceutical and biotech industry are interested in either licensing the technologies developed or in

undertaking collaborations with the project partners. The newly developed technologies can also form the basis for spin-off companies.

Together with its partners, CD3 has taken the first steps in the 'hit-to-lead' phase for around 17 projects to discover new drugs for multiple disorders, including HIV infections, Alzheimer's disease, cancer, pain, arthritis, asthma, auto-immune disorders and Dengue virus infections.

Several of these projects have already been out-licensed to pharma or biotech

companies to allow them to further develop the potential drugs.

For example, in 2013, the intellectual property rights for novel Dengue antivirals were partnered with Janssen Pharmaceuticals.



	Hit identification	Hit -to-Lead	In vivo POC / Lead optimisation	Preclinical	Partnered / supported
HIV infections LEDGF-integrase inhibitors	██████████	██████████	██████████		ViiV Healthcare
Alzheimer's disease Tau aggreg. ind. toxicity inhibitors	██████████	██████████	██████████		reMYND
Dengue virus infections phenotypic	██████████	██████████	██████████		Wellcome trust Janssen Pharmaceuticals
AutoImmune disorders - Cancer MALT1 inhibitors	██████████	██████████	██████████		AstraZeneca
Cancer MCT1 inhibitors	██████████	██████████	██████████		
Pain TRPM3 antagonists	██████████	██████████	██████████		
Pain - Overactive bladder TRPM8 antagonists	██████████	██████████	██████████		
Asthma - COPD Human Rhino Virus inhibitors	██████████	██████████			Novartis
OsteoArthritis BMP2 modulators	██████████	██████████			Arcarios
Feline Calicivirus infections phenotypic	██████████	██████████			Okapi Sciences
Obesitas	██████████	██████████			
Cancer	██████████	██████████			
Cancer DUB inhibitors	██████████	██████████			



LayerWise was founded as a KU Leuven spin-off company in 2008 and is one of the top players in metal Additive Manufacturing (AM) technology, a technology developed to build up materials in layers. After gaining recognition across industrial sectors, AM is increasingly being adopted in different medical fields such as dentistry, orthopaedics, maxillofacial and spinal surgery. LayerWise intensively collaborates with academic partners, and heavily invests in research and development to push the boundaries of AM technology. In 2014, LayerWise was acquired by 3D Systems. [www.layerwise.com]



Cartagenia, a KU Leuven spin-off company, delivers diagnostic knowledge, software and database systems, and related services that enable genetics labs and clinicians to perform clinically relevant genetic analyses quickly and efficiently, and allow them to offer patients and carers high quality genetic interpretation and counseling. Genetics is one of medicine's fastest growing fields as man's ability to capture, store and interpret genetic data expands exponentially. Applications and demand are set to rise exponentially over the next 20 years. [www.cartagenia.com]



Aratana Therapeutics focuses on delivering innovative therapeutic solutions for unmet medical needs of dogs and cats. In 2014, Aratana Therapeutics acquired the KU Leuven spin-off company Okapi Sciences. Okapi Sciences specialised in the development of drugs for the treatment or prevention of viral infections in pet animals and livestock, such as swine fever and foot and mouth disease. [www.aratana.com]



ImCyse is developing a promising disease-modifying vaccine to treat multiple sclerosis (MS). ImCyse has recently announced that the company plans to start its first-in-human-therapy (FIHT) with the product in October 2014, enrolling 18 patients with relapsing-remitting MS. Even though treatment options for patients with multiple sclerosis have considerably improved in recent years, there is still no cure for the debilitating disease. Today's next-generation drugs (dimethyl fumarate-based) only treat symptoms of the progressive disorder, rather than halt or reverse the course of the disease. In response to the needs of both patients and the pharmaceutical industry, a product that could actually cure the disease would be a greatly welcomed breakthrough.



ReGenesys is a wholly owned subsidiary of Athersys, a publicly-held biotechnology company located in Cleveland, Ohio (NASDAQ: ATHX). The company's core business unit centres on a therapeutic stem cell opportunity based on pluripotent stem cells isolated from bone marrow. The company has established master cell banks and has successfully produced a cGMP cell product in accordance with FDA guidelines, MultiStem®. ReGenesys is establishing a xeno-free stem cell product and additional banks in Europe. ReGenesys is focusing on manufacturing to support clinical activities. [www.regenesys.eu]



Materialise was set up as a KU Leuven spin-off company in 1990 and has grown into an international player in the Additive Manufacturing (AM) industry with more than 1000 employees. Apart from having the largest capacity of AM equipment in Europe, Materialise has acquired the position of market leader for 3D printing and Digital CAD software. Materialise is also a major player in medical and dental image processing and surgery simulation. Materialise is creating important added value in the field of orthopaedic and maxillofacial implants. [www.materialise.com]



TiGenix NV (NYSE Euronext Brussels: TIG) is a leading European cell therapy company with one commercial product, ChondroCelect®, and a strong pipeline of clinical adult stem cell products for the treatment of autoimmune disorders and inflammatory diseases. TiGenix was established as a spin-off of KU Leuven and Ghent University, and merged with the Spanish Cellerix SA in 2011.

TiGenix has its headquarters in Leuven (Belgium) and has establishments in Madrid (Spain) and Sittard-Geleen (the Netherlands). ChondroCelect® is a cartilage regeneration product. It has been approved by the European Medicines Agency and is sold in Belgium, the Netherlands, Germany, the United Kingdom, Finland and Spain. TiGenix has a stem cell product, Cx601, for the treatment of perianal fistulas in patients with Crohn's disease in Phase III; a stem cell product, Cx611, for the treatment of rheumatoid arthritis in Phase II; and a stem cell product, Cx621, for autoimmune disorders in Phase I. [www.tigenix.com]

Leuven, integral to a strong Belgian pharmaceuticals industry

Belgium is a world leader in the export of biopharmaceutical products. Pharmaceuticals account for over 10% of Belgium's total exports. The Belgian biopharmaceutical industry is a key sector in terms of jobs: it employs almost 30,000 workers and this figure is growing year on year.

Accordingly, both the pharmaceuticals industry and the Belgian government are investing heavily in developing this sector even further and major drives are under way to promote innovation and R&D.

Private investment

Every year, the pharmaceuticals industry ploughs over € 1.5 billion into R&D. This represents 40% of all private investments in R&D in Belgium, double the European average.

Government support

The government also supports the pharmaceuticals industry – and R&D in general – via a range of tax incentives and discounts and by offering assistance in hiring qualified researchers. A consultation platform that forges links between the pharmaceuticals industry and the government has also been set up to improve public health and boost innovation and employment.

The Belgian government supports life science projects by providing regional grants of up to € 38 million per project. Other fiscal measures include tax deductions. For example, income from new patents is eligible for 80% tax relief. Belgian companies can save up to 75% of payroll taxes on salaries for scientific researchers. All R&D initiatives are eligible for a 150% tax deduction and Belgium has one of the world's most favorable tax systems for patent income at just 6.8%.

Source: The Belgian Pharmaceuticals Cluster, Harvard Business School

 Bayer CropScience

 Abylnx

 OMEGA PHARMA

 deVGen

 cropdesign

GHENT

 Pfizer

ANTWERP

 janssen
PHARMACEUTICAL COMPANY OF Johnson & Johnson

 genzyme

TURNHOUT

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A Promise for Life

 sanofi aventis
Because health matters

 NOVARTIS

 RANBAXY

 gsk
GlaxoSmithKline

 Phibro
ANIMAL HEALTH CORPORATION

 Baxter

 Dyax

Leuven, a great place to live

Leuven is a beautiful, welcoming and accessible – in short, a great – place to live. Steeped in centuries of culture and history, Leuven quickly captures your heart. It is an internationally oriented city accustomed to accommodating individuals and families from every background. It boasts an excellent education system, including international schools, and offers a high standard of medical care. It is fully linked into Belgium's motorway, railway and bus network and is only 15 kilometres from Brussels International Airport and 25 kilometres from Brussels, the capital of Europe. With a population of 98,000 inhabitants, Leuven is a lovely medium-sized city offering a pleasant balance between work, leisure, culture and sport. Since its founding in 1425, KU Leuven has played an important role in the history of the city, which itself spans more than a thousand years.

Many historic buildings, such as the city hall, the university hall, Saint Peter's Church and the university library, bear witness to Leuven's prosperous history. The Stella Artois brewery, which was established in 1366 and has now, as AB Inbev, become a global player in brewing, has also helped shape Leuven into the flourishing city it is today.

The city's 50,000 students, spread across the university and university colleges, give the city a youthful and vibrant feel. 154 nationalities work, study and live in Leuven and give the city an unmistakably international flavour. There are plenty of bars, restaurants, sports facilities and music events to enjoy, while those searching for a little peace and quiet can go for a stroll in the parks, squares, museums or countryside in and around Leuven.



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