

Technology transfer for academic research
A company of the LifeScience Foundation



ANNUAL REPORT

2016

Life Sciences into Business

Innovation. For the benefit of all.

Focus on life sciences

Ascenion is an independent technology transfer company that supports more than 30 partners in Germany and Europe: research institutes, university hospitals and associated organizations. Our focus is life sciences. We work closely with our partners to identify research results with great commercial potential, securing patent protection and developing them further. Our team's particular strengths are project development and start-up support. Together we have already launched numerous diagnostics and therapies that benefit millions of people.

In 2016 alone, a turnover of more than **EUR 2 billion** worldwide was achieved with products and services based on research results from Ascenion's partner institutes.

Around **340 people** were employed by companies in which Ascenion held equity in 2016.

At home in industry and academia

At the end of 2016 Ascenion had more than 30 employees. We are interdisciplinary, international and industry-experienced.

We are:

- technology managers and project developers
- lawyers and negotiation experts
- start-up coaches and equity managers



2016: foundation model as popular as ever

Ascenion is a 100% subsidiary of the LifeScience Foundation for the Promotion of Science and Research. This idea of integrating technology transfer at academic institutions into a foundation model is unique in Germany. The LifeScience Foundation is now 16 years old, and was developed by the founding research institutes themselves. The model remains as attractive as ever, gaining two further endowing institutes in 2016: the Charité – Universitätsmedizin Berlin, and the Research Center Borstel (FZB), an institute of the Leibniz Association.



The endowments of the Charité and FZB demonstrate a clear commitment to technology transfer and support for the foundation model. They also provide continuing encouragement for our activities at Ascenion: our team examined 100 invention disclosures in the past year and negotiated as many agreements, 39 of which carried revenues. At the same time we have intensively supported 6 start-up projects and technology developments.

Each and every one of these projects has benefitted from the commitment and energy of the scientists involved, of our technology transfer colleagues at the respective institutes, and of Ascenion staff.

Together we have overcome several obstacles and in 2016 have once again reached many milestones:

- 2 product approvals
- 3 new clinical trials commenced
- 1 new start-up
- 6 seed or follow-up financings

We would like to thank our partners who, with their research projects and their confidence in our team, lay the foundations for these achievements.

We are proud that in 2016 we were once again able to feed profits generated by our activities back into research via the Foundation.

Dr Christian Stein
CEO, Ascenion



The LifeScience Foundation and its subsidiary Ascenion were established by four research institutes in 2001. Today the Foundation has 11 endowing institutes, all of them outstanding German biomedical institutes and university hospitals. We are proud of this development, and particularly grateful to Ascenion's management and staff for their extraordinary achievements.

Their competent, long-term oriented work has once again resulted in significant commercial exploitation successes in the past year, from which the endowing institutes profit on two levels: directly through contractual milestone, licensing and other payments from industry partners, and also through funding supplied by the Foundation made possible by profit distributions from Ascenion.

Ascenion distributed around EUR 1 million to the Foundation in 2016. In line with the Foundation's mission, we make these funds available to our endowing institutes as grants for research projects aimed at improving human health and quality of life.

Nicolaus Steenken and Dr Ronald Mertz
Chairmen of the LifeScience Foundation

Ascenion's Partners

Science

Ascenion supported technology transfer at 36 publicly funded research institutes and university hospitals in 2016. 31 of these are long-term partners including 10 endowing institutes of the LifeScience Foundation for the Promotion of Science and Research. A further 5 are institutes that Ascenion has worked with on specific projects.

Helmholtz Association

- DZNE, German Centre for Neurodegenerative Diseases
- HZDR, Helmholtz-Zentrum Dresden-Rossendorf*
- HZI, Helmholtz Centre for Infection Research*
- Helmholtz Zentrum München, Research Center for Environmental Health*
- MDC, Max Delbrück Centre for Molecular Medicine in the Helmholtz Association*

Leibniz Association

- ATB, Leibniz Institute for Agricultural Engineering and Bioeconomy
- BNITM, Bernhard Nocht Institute for Tropical Medicine
- DiFE, German Institute of Human Nutrition*
- DPZ, German Primate Center*
- DRFZ, German Rheumatism Research Centre
- FLI, Fritz Lipmann Institute - Leibniz Institute on Aging
- FZB, Research Center Borstel - Leibniz Center for Medicine and Biosciences*
- HKI, Hans Knoell Institute - Leibniz Institute for Natural Product Research and Infection Biology*
- HPI, Heinrich Pette Institute for Experimental Virology and Immunology
- IFW, Leibniz Institute for Solid State and Materials Research Dresden
- IPF, Leibniz Institute for Polymer Research Dresden
- IPK, Leibniz Institute of Plant Genetics and Crop Plant Research
- LIKAT, Leibniz Institute for Catalysis
- LIN, Leibniz Institute for Neurobiology
- ZMT, Leibniz Centre for Tropical Marine Research

Universities, university hospitals and others

- Charité - Universitätsmedizin Berlin*
- MHH, Hannover Medical School*
- TWINCORE, Centre for Experimental and Clinical Infection Research
- BTO, Bergen Teknologioverføring (Norway)
- DZHK, German Center for Cardiovascular Research
- iba, Institute for Bioprocessing and Analytical Measurement Techniques
- IMB, Institute of Molecular Biology
- LIFE & BRAIN
- MGC, Mouse Genetics Cologne Foundation
- UMG, University Medical Center Göttingen
- ULL, University of La Laguna (Tenerife)

HELMHOLTZ
GEMEINSCHAFT

Leibniz
Association

MHH
Medizinische Hochschule
Hannover

CHARITÉ

BERLIN
INSTITUTE
OF HEALTH
Charité & Max Delbrück Center

* endowing institutes of the LifeScience Foundation

Business and investors

Ascenion boasts a comprehensive worldwide network of industry representatives and capital investors in relevant sectors. Long-term personal contacts form the basis for the successful initiation of cooperation and licensing agreements. In 2016, Ascenion managed around 460 active contracts with industry partners.

Global concerns

Regional innovation leaders
Medium-sized companies Incubators
Pharmaceuticals Food Start-ups
Environmental technology IT Diagnostics
Big Data
Medical technology Banks Agricultural technology
Venture capitalists CROs Investment funds
Biotechnology Family Offices Foundations

Knowledge and technology transfer

As accredited coaches, consultants, trainers and experts, Ascenion's employees are contributing continuously to the development of the technology transfer landscape. They are involved – partly in a voluntary capacity – in education and training, establishing professional standards and the promotion of technology transfer at all levels: regional, national and international.

In 2016 Ascenion was active in over 15 initiatives and associations, such as:

- ASTP-Proton
- Alliance of Technology Transfer Professionals (ATTP)
- Association of University Technology Managers® (AUTM)
- BayStartUP
- BioDeutschland
- BioFIT
- DECHEMA
- Forum MedTech Pharma
- H2020 projects: ESOTRAC + UTILE
- IDEA Summit
- Innoderm
- Knowledge Transfer Ireland
- Licensing Executives Society (LES)
- Life Science Inkubator
- TechnologieAllianz
- Wirtschaftsagentur Wien

2016 in figures



IDENTIFY AND PROTECT

commercially promising research results

100 invention disclosures
39 patent applications
20 technology transfer training courses for scientists



COMMERCIALIZATION

through cooperations and licensing

39 revenue-generating license and cooperation agreements negotiated and concluded
90 additional technology transfer-related agreements, such as material transfer agreements
EUR 11.1 m revenue for Ascenion's partners from agreements negotiated by Ascenion

through start-ups

1 new holding in a start-up acquired
6 portfolio companies financed to the sum of EUR 26.4 m (grants and private capital)
shares or partial equity in 2 companies sold

RESEARCH

31 publicly funded research institutes and university hospitals
10 of which are endowing institutes of the LifeScience Foundation



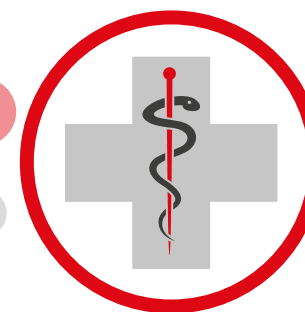
EUR 1 m payout received from Ascenion
EUR 1 m in funding committed to 5 research projects at 4 endowing institutes



DEVELOPMENT

to a stage that is attractive to industry and investors

EUR 4.8 m funding secured for partner institutes
6 intensively supported start-up projects and technology developments



APPLICATION

- Market approval of a diagnostic for patient stratification in acute coronary syndrome
- CE-mark for a respiratory support device for COPD patients
- Initiated Phase I clinical trial of a drug for cardiac failure
- Initiated Phase I/Ib clinical trial of a cancer drug
- Initiated Phase II clinical trial of a cancer vaccine

Catheter – yes or no? Diagnostic test for heart patients

2016 saw the market launch of a new test from Roche Diagnostics: Elecsys® GDF-15. Based on research by Prof. Kai C. Wollert at the Hannover Medical School (MHH) it enables better risk evaluation of patients with acute coronary syndrome (ACS). The serum level of GDF-15 can be measured with the test in about 20 minutes. The prognostic significance of this parameter has been confirmed in several studies, independently from established markers such as patient age and ECG. The test therefore offers the physician an additional valuable indicator when deciding on the course of treatment.

'This can make a big difference for patients,' says Dr Ralf Cordes, Technology Manager at Ascenion. The researchers have shown that ACS patients with significantly raised GDF-15 levels are more likely to benefit from examination by cardiac catheterization.

The procedure can significantly reduce their risk of reinfarction and mortality. The team at Ascenion has been accompanying Prof. Wollert's project for many years, and negotiated the licensing agreement with Roche Diagnostics.

Identify and protect

Every innovation begins ...

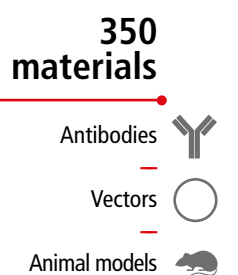
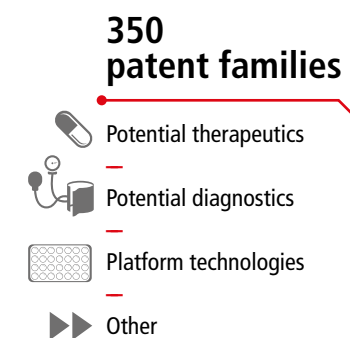
... with scientists. Their brilliant ideas are the basis for applications that change all our lives. This is why we invest in personal contacts and give ourselves time to fully understand their projects. To this end, we work closely with our technology transfer colleagues at the respective institutes. Together we identify promising projects as soon as possible, assess their potential and, where appropriate, develop a suitable patenting and commercialization strategy.

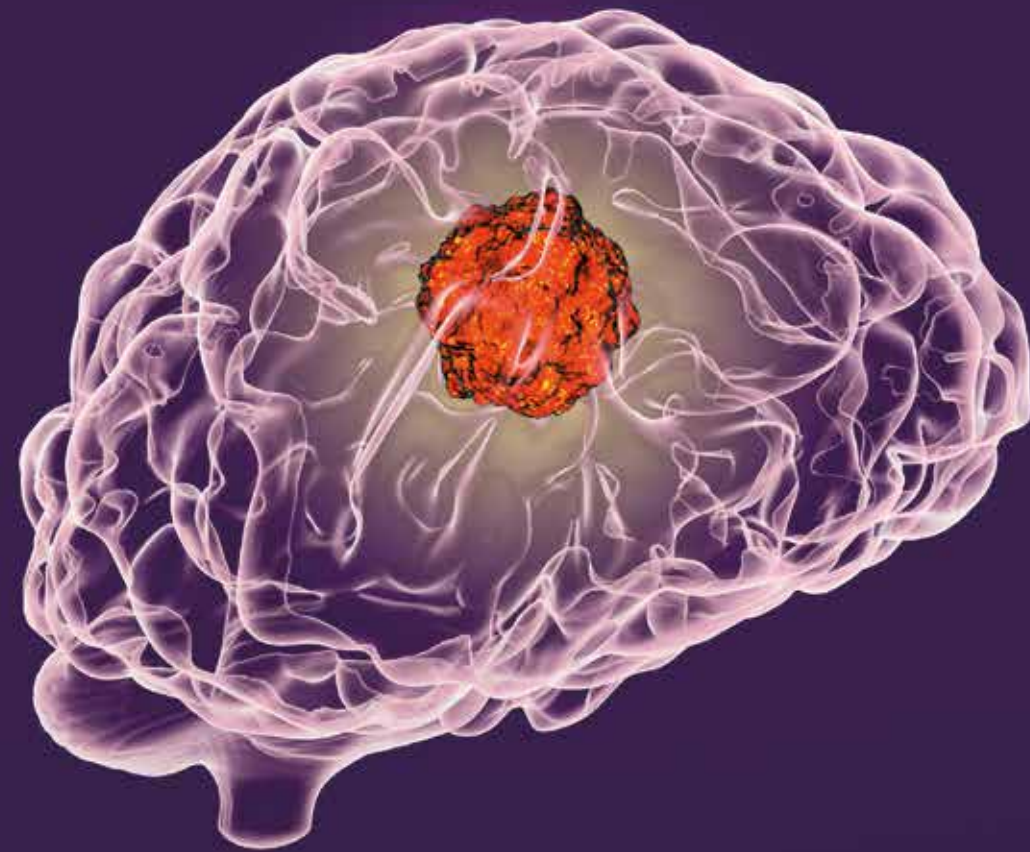


100 invention disclosures assessed for our partner institutes in 2016.

39 patent applications managed in 2016.

We currently manage a portfolio of around 700 patent families and commercially attractive materials for our partners:





Two-pronged attack: radioimmune therapy for brain tumours

Funding of EUR 3.5 million was secured in June 2016 by Prof. Reinhard Zeidler and his team at the Helmholtz Zentrum München. The support comes from the German Federal Ministry of Education and Research (BMBF) and the Helmholtz Validation Fund (HVF). It will enable the team of scientists and clinicians to advance their innovative approach to the treatment of glioblastoma, a frequent and highly aggressive form of brain tumour, and investigate its efficacy in the clinic.

The researchers have developed a conjugate containing a beta emitter and Fab fragments of an antibody that binds with high specificity to an enzyme on the surface of tumour cells in the brain.

When used after tumour resection, the conjugate directs highly active beta radiation to the immediate vicinity of dangerous metastases, thus killing them.

The team's next tasks are to start production according to Good Manufacturing Practices (GMP) guidelines and prepare a clinical trial. 'The project of the Helmholtz Zentrum München offers huge potential for glioblastoma patients, who currently have very poor life expectancy,' says Dr Stefanie Possekel, Director at Ascenion. 'It could also become a model for translation via interdisciplinary teams in the academic environment.'

Development

The success of innovation ...

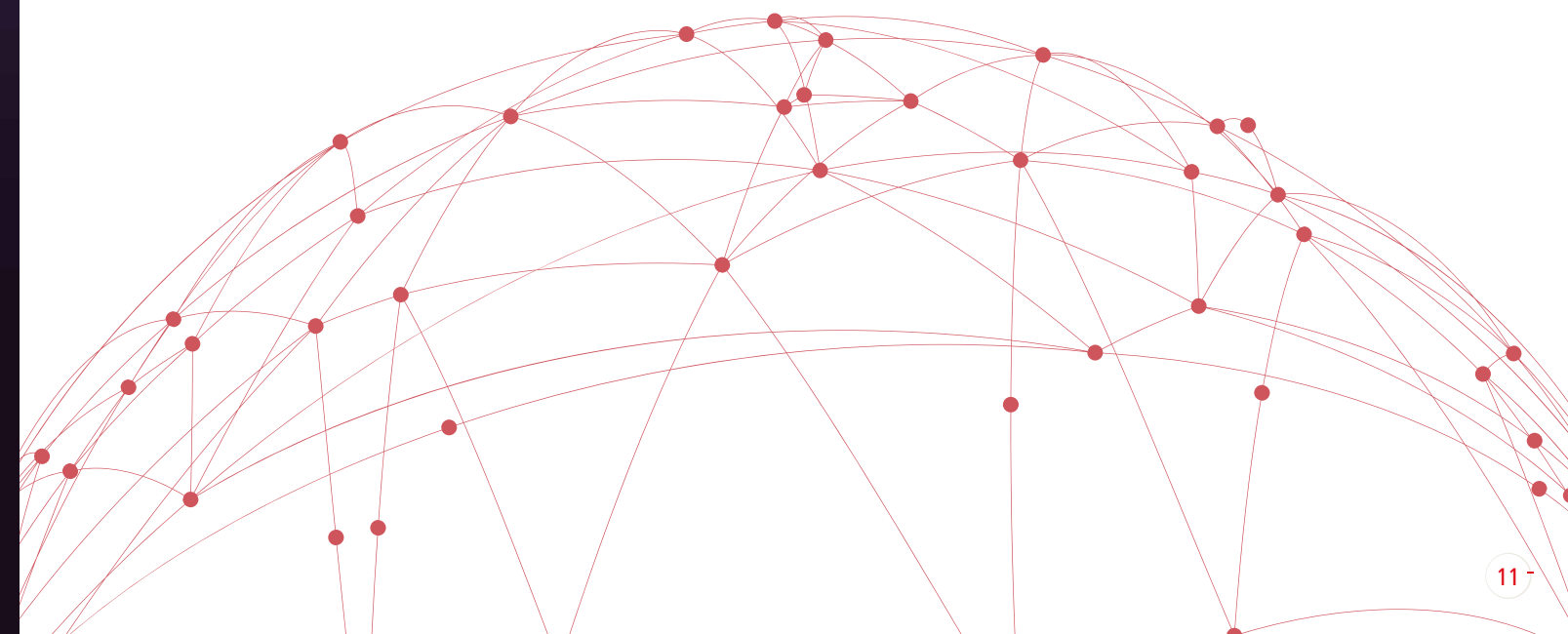
... from the academic environment depends to a great extent on project development. If a new therapeutic or diagnostic approach has not been properly validated, there is little chance of attracting an industry partner. We are familiar with industry evaluation and development mechanisms, and use our know-how to advance early academic projects step-by-step in a targeted way. The role that we take in this process varies from project to project. We are a sparring partner, project manager or co-architect of innovative development structures. In addition, we support the acquisition of the required financing and funding.

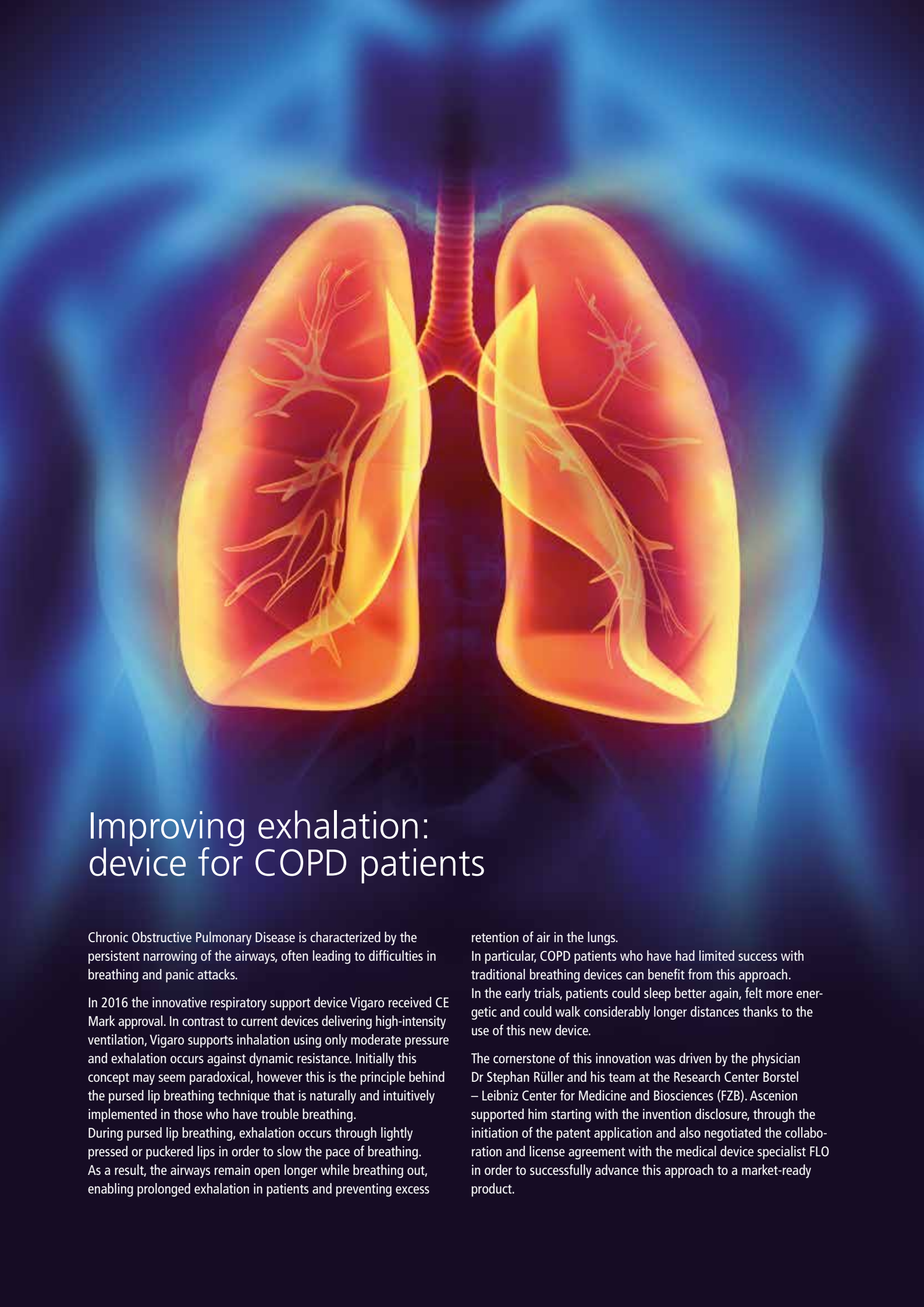


4.8 m EUR in funding for translational development was secured by our partners with our help in 2016.

Founded together: MD-CEL for the development of gene therapies

With Ascenion's help, the MDC established a unique translational centre in 2016 - the 'Max-Delbrück Center Cell Engineering Lab' (MD-CEL). Its goal is to advance a completely new concept of cell-based gene therapy for cancer. Precisely because the approach is so new, there are many challenges to be overcome on the way to clinical application. This requires partners with experience in all relevant sectors: from scientific research to production and clinical development. For this reason, scientists at MD-CEL work at very early project stages with three industrial companies. The development work is jointly financed: partly by the industry partners, and partly by the Helmholtz Association (as Helmholtz Innovation Lab).





Improving exhalation: device for COPD patients

Chronic Obstructive Pulmonary Disease is characterized by the persistent narrowing of the airways, often leading to difficulties in breathing and panic attacks.

In 2016 the innovative respiratory support device Vigaro received CE Mark approval. In contrast to current devices delivering high-intensity ventilation, Vigaro supports inhalation using only moderate pressure and exhalation occurs against dynamic resistance. Initially this concept may seem paradoxical, however this is the principle behind the pursed lip breathing technique that is naturally and intuitively implemented in those who have trouble breathing. During pursed lip breathing, exhalation occurs through lightly pressed or puckered lips in order to slow the pace of breathing. As a result, the airways remain open longer while breathing out, enabling prolonged exhalation in patients and preventing excess

retention of air in the lungs.

In particular, COPD patients who have had limited success with traditional breathing devices can benefit from this approach. In the early trials, patients could sleep better again, felt more energetic and could walk considerably longer distances thanks to the use of this new device.

The cornerstone of this innovation was driven by the physician Dr Stephan Rüller and his team at the Research Center Borstel – Leibniz Center for Medicine and Biosciences (FZB). Ascenion supported him starting with the invention disclosure, through the initiation of the patent application and also negotiated the collaboration and license agreement with the medical device specialist FLO in order to successfully advance this approach to a market-ready product.

Commercialization I: cooperations and licensing

The right partner for innovation ...

... is one who shares our research partners' goals and possesses the resources and experience required to achieve them. We use our network to find the best 'match' for every project and objective. This could be a Big Pharma partner or a regional specialist. In each case, we negotiate agreements, facilitate the progress of the project, increase the chances of application and compensate inventors and institutes fairly in line with market terms. Above all, Ascenion is there to help when things get complicated, e.g. when international inventor consortia are involved, or creative deal structures are required.

Revenues from cooperation and licensing agreements go directly to our partner institutes and the inventors involved. Ascenion receives a commission.



6 industry events in 4 countries were visited by our team in 2016 in order to promote our partners' technologies and initiate partnerships.

39 revenue-generating agreements were negotiated on behalf of our partners in 2016, some of which we also initiated, together with a further **90** agreements, e.g. for material transfer.

11.1 m EUR earned by our partner institutes in 2016 from licensing and material transfer agreements negotiated by us.

Right on target: mushroom poison against cancer

In September 2016 the Max Delbrück Center for Molecular Medicine (MDC) and the WILEX subsidiary Heidelberg Pharma signed an option agreement with the goal of developing a new therapy for the treatment of multiple myeloma, a cancer of plasma cells in bone marrow. Under the terms of the agreement, Heidelberg Pharma will couple MDC antibodies that specifically bind to plasma cells to a toxin that occurs in *Amanita* mushrooms such as the death cap. These innovative 'precision weapons' transport their toxic cargo directly to diseased plasma cells. The principle has already been validated by the partners in a previous cooperation, and preclinical testing is underway. Clinical trials are planned to start in 2018. 'Despite significant advances, multiple myeloma is still not curable, so this extremely productive cooperation brings great hope,' comments Dr Michael Karle from Ascenion, who together with his colleagues initiated the cooperation and negotiated the agreement.

Commercialization II: start ups

To develop innovations ...

... you need scientists with entrepreneurial spirit. We can support you with the experience gained from around 100 start-up projects we have accompanied so far. We often work closely with partners in the run up to launching a start-up, helping with project development, financial and business planning, even with putting together the team. We also offer access to our network, bringing entrepreneurs in touch with the right contacts: investors, industry representatives, hospitals and regulatory experts, e.g. at the Biotech NetWorkshop or at BioVaria's Spin-off Panel. These fora were both established by Ascenion, together with other technology transfer organizations, especially for the benefit of entrepreneurs.

Ascenion usually acquires equity in the start-up, and manages this as profitably as possible until exit. Most of the revenues from the sale of its equity are distributed to the LifeScience Foundation.

1 new equity holding.

1.36 m EUR in revenue through sale of shares and equity, mostly distributed to the LifeScience Foundation.

22 active equity holdings.

26.4 m EUR in financing acquired by 6 portfolio companies (grants and private capital).

2 Phase I trials and **1** Phase II trial started by 3 portfolio companies.

60 participants at the 10th Biotech NetWorkshop.

Unlocking liver regeneration: HepaRegeniX

EUR 9 million Series A financing was secured by HepaRegeniX at the end of 2016 – sufficient to further advance its innovative approach to the treatment of liver disease. The first milestone is the development of a lead candidate, the second the preparation of clinical trials.

The concept is based on research results previously obtained by HepaRegeniX cofounder Prof. Lars Zender and his team at the Helmholtz Centre for Infection Research (HZI) and the Hannover Medical School (MHH). 'The researchers have discovered a switch

with which they can reactivate the regenerative capacity of the liver in a highly specific way. This could give patients with chronic or acute liver disease a completely new chance – in the long term, maybe even an alternative to transplantation,' says Dr Sabina Heim, Technology Manager at Ascenion. Together with her colleagues at Ascenion and at the HZI, she has been intensively supporting the entrepreneurial team throughout the patenting and project development stages, and during the company launch.



Bacteria-free production: vaccine for meningitis

Meningococci, the main pathogens of bacterial meningitis, still cause epidemics in certain regions in the world, for example in Africa and India. There is an effective vaccine, but its production is cumbersome. Up to now, large amounts of the pathogen had to be cultured, from which the required antigens were isolated in several production stages. This brings with it two problems: first the associated biohazard and second, the purification and disposal of the bacterial cultures. Prof. Rita Gerardy-Schahn and her team at the Hannover Medical School's Institute for Cellular Chemistry have therefore developed an alternative, completely bacteria-free production method that can also be used in infrastructure-poor countries.

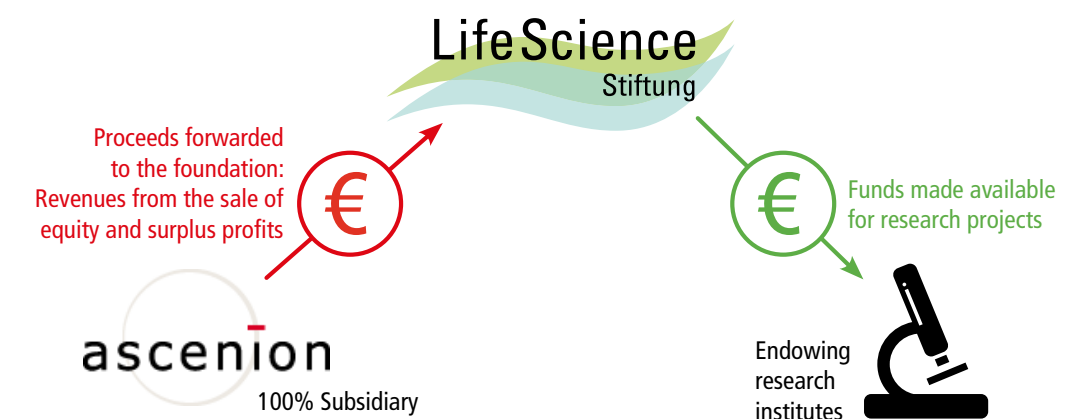
The LifeScience Foundation has supported the project with a grant of EUR 89,000. The money was used to purchase special chromatography equipment that was essential to establishing the new, enzyme-catalysed production process. The equipment not only enables the production of the necessary starter molecules of defined length, but also the tracking of the manufacturing process and reliable quality control.

LifeScience Foundation

The foundation for innovation ...

... is the LifeScience Foundation for the Promotion of Science and Research. It is Ascenion's sole shareholder. As a non-profit organization, it promotes research projects for the benefit of society at its endowing institutes. The necessary funds mostly come from Ascenion's revenues. Over the past 10 years, Ascenion has on average distributed around EUR 760,000 per annum to the foundation. The Foundation has made approximately 90% of this available as funding.

This foundation model is unique in Germany. Via Ascenion, it offers all life-science-oriented research institutes specific and professional technology transfer support, including support for spin-offs. In addition, institutes that choose to endow the foundation can maximize their revenues from technology transfer and play a part in the development of the Foundation and its subsidiary Ascenion.



2 endowing institutes gained in 2016: the Charité – Universitätsmedizin Berlin, and the Research Center Borstel (FZB), an institute of the Leibniz Association.

11 endowing institutes in total in 2016: institutes of the Helmholtz association, the Leibniz association and university hospitals.

1 m EUR in funding provided by the Foundation in 2016 for research at endowing institutes.

5 projects at 4 research institutes were supported in this way.



The European platform for innovation ...

... from the academic life sciences is BioVaria, a showcasing event organized by Ascenion and its technology transfer partners for the 9th time in 2016.

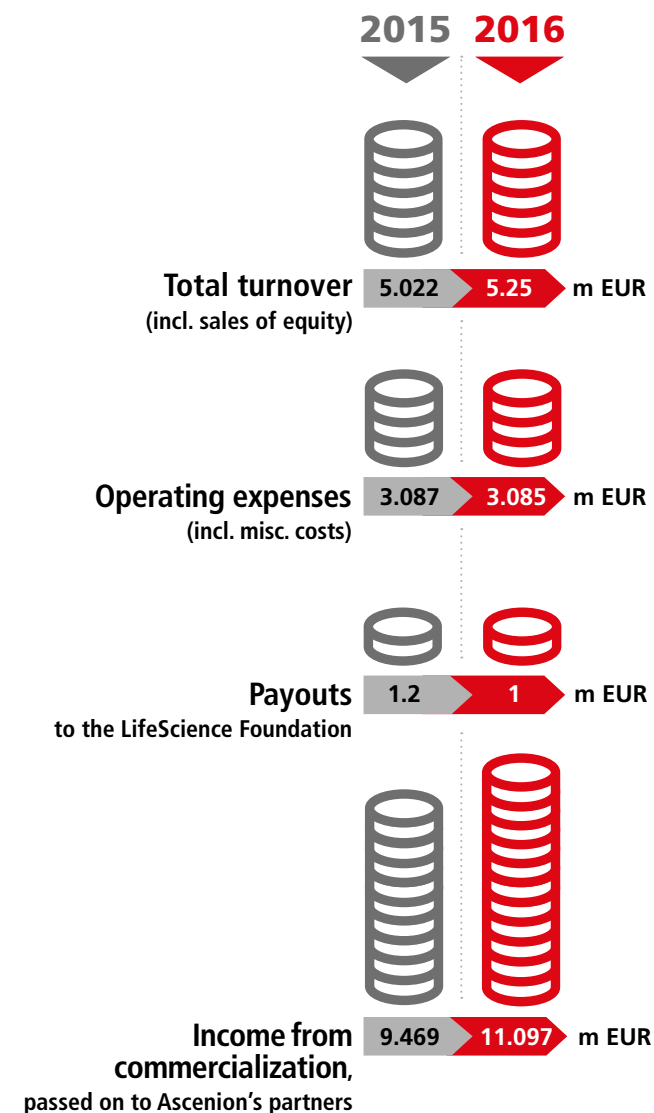
Potential cooperation partners, licensees and investors arrive from all over the world to learn about the most innovative projects and spin-offs from European life-science research. Numerous valuable contacts are forged and cooperations initiated at BioVaria each year.

BioVaria in 2016:



Financial results in 2015 and 2016

Ascenion's revenues are made up of consultancy fees, performance-related bonuses and proceeds from equity transactions. Ascenion distributes most of any surplus to the LifeScience Foundation.



Ascenion's structure

The LifeScience Foundation is Ascenion's sole shareholder.

The endowing institutes are represented by seven board members or managing directors on the Foundation Board, but have no connection to the Foundation under corporate law. They elect the Chairmen who oversee Ascenion's business activities. Important business decisions are made by Ascenion's CEO and the Foundation's Chairmen, Nicolaus Steenken and Dr Ronald Mertz.

Ascenion is economically independent. An Advisory Board advises the company on strategic and technical issues. The Board Members are: Dr Manfred Baier (prev. Roche), Dr Timm-H. Jessen (Topas GmbH), Dr Joachim Rothe (Life Sciences Partners).

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