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PEPPERMINT
VENTURE PARTNERS

PORTFOLIO NEWS

# THE JOURNEY FROM MEDTECH INTO DIGITAL HEALTH

www.peppermint-vp.com

# THE STORY SO FAR

**When Peppermint Venture Partners was founded in 2009, with the first fund starting in 2011, our vision was clear: to find startups with groundbreaking innovation in the area of medical technology. Around the same time, as digitalization started making its way into all domains of life, this field became more widely recognized in healthcare, too, under the term "digital health", and investments started rising.**

Unlike many investors who enter the digital health space from the IT side and expecting short sales cycles, coming to digital health space with a medical perspective, we were aware from the start that we would have to stay with our portfolio companies for many years before they will be mature enough for a broader market entry. After all, we had experience in medical technology investments and, more importantly, our primary interest lay in solutions addressing unmet medical needs. Those investments, whether they be classical medical technology or digital health projects, will typically need clinical evidence and a lot of testing before they can be widely spread. In this regard, we were pioneering digital health investments early on. In addition, we kept investing in pure medical technologies and expanded our focus, now ranging from highly regulated class III medical technologies on the one side of the spectrum to full digital therapies on the other end of health technologies.

In the end, four of our eight portfolio companies have either full digital business models with software as the main product or combinations with hardware. The other half of the portfolio consists of pure device and technology companies. The portfolio includes two solutions in cardiology, two in the area of ophthalmology, one in diabetes management, one for the acceleration of gene therapies, vaccines and biological drug development, one for laboratory data management, and one changing the paradigm of liver function testing.

It gives us pride to see the technological milestones, success on the reimbursement side, market access and established partnerships the companies have managed to achieve.

Labfolder, a productivity platform for research teams, has gained more than 15,000 users since its inception and is becoming one of the leading software programs for laboratory scientists. Humedics' LiMAx breath test is providing real-time, previously unavailable data on functional liver capacity, and the company is now expanding from medical centers in Germany to medical centers in Europe. Emperra, a revolutionary digital diabetes management system with the first in the world

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Smart Insulin pen transmitting insulin doses on a cloud platform, is about to enter the US market. CryoTherapeutics, a novel approach in treating heart attacks, which could potentially help to prevent such events in future, just started clinical testing in humans. Implandata, the company that invented the first wireless eye pressure sensor for Glaucoma patients, is expecting to roll out an even smaller, injectable sensor for continuous monitoring of intraocular eye pressure in the next 18–24 months.

Caterna Vision Therapy for children with amblyopia became the first so-called "app on prescription" in Germany, thanks to studies showing that this digital therapy reduces treatment time (currently patching the eye) significantly and improves outcome. CEVEC Pharmaceuticals, developing high-quality platforms for the efficient and safe production of glycosylated proteins, viral vaccines and gene therapy vectors is involved in the development of one of the Zika vaccines, and Miracors PiCSO® Impulse System, the first and only coronary sinus intervention for better outcomes after acute myocardial infraction (AMI), with the potential for preventing the development of heart failure following AMI, is in the process of finalizing CE re-certification and is expected to start a European Randomized Trial next year.

Over the next 18 months we expect potential strategic transactions to happen between our portfolio companies and corporates. At the same time we are preparing for our next fund which will be a continuation of the current funds' successful investment strategy at the crossroads of medical technology and digital health.

We hope you will enjoy reading about the progress our portfolio companies have made, as well as the outlook for our next fund.

*The Peppermint Venture Partners-Team*

*Ingeborg Naumann*



*Dr. Joachim Rautter*

*Dr. Klaus Stöckemann*

# CATERNA VISION: ONLINE VISUAL EXERCISES FOR AMBLYOPIA ("LAZY EYE")

**Pretending to be a pirate, with a patch over one eye, can only be fun for a very limited amount of time during childhood. However, for most children with amblyopia (also called lazy eye) regular patching of one eye is a must if they want to regain normal vision.**

Amblyopia occurs due to abnormal vision development in early childhood or infancy and causes a decreased vision in one eye. The current widely adopted clinical treatment is regular daily patching of the dominant eye for several hours. This stimulates the brain to reestablish the pathways between the brain and the weak eye. The average treatment period is around two and a half years. Since most patients are very young children, achieving compliance – multiple hours of patching during the day – is a big challenge for parents.

CATERNA has found a way to treat Lazy Eye with the Caterna Vision Therapy (CVT). CVT is an online application consisting of a special brain stimulating pattern, topped with a video game to retain the patient's attention. The patient occludes the healthy eye and plays the game for 30–45 minutes daily. More than 1000 therapies have already been carried out with CVT, most of them in Germany, where the therapy became the first so-called "app on prescription" in Germany. It is already prescribed by more than 250 ophthalmological practices and clinics, and reimbursed by insurance companies including BARMER GEK as the frontrunner and currently 14 other

German statutory and private insurance companies, among them Siemens Betriebskrankenkasse, BMW BKK, Audi BKK, Heimat BKK, Bergische Krankenkasse, Diakonie BKK as well as Axa and Hanse Merkur.

CVT was developed in collaboration with the Technical University Dresden (Germany) and renowned ophthalmologists from all across Germany. The innovative therapy was tested in clinical trials that confirm its utility. "The inventors of CVT designed the solution based on a treatment for amblyopia used in the 60s," explains the CEO Michael Scherrer. "At that time children with amblyopia were treated by pleoptic therapy, where they would look at a vertical grid through a special machine," explains Scherrer. This is the origin of the idea for exposing the patient's lazy eye to a special strip-like pattern. In the 60s, pleoptic therapies became unsustainable because they were too time-consuming to be carried out in hospitals and were also not transferable to the patient's home. But with the development of digital technologies, exposure to the pattern approach became possible again.

The company has been focused on the German and Austrian market so far. The last funding round was closed earlier this year, enabling CATERNA to move forward in development. At the moment CVT video games can be played on a PC or laptop, with the company planning to extend the app to handheld devices. The second goal is shifting from a solely B2B2C model to include a direct B2C approach, alongside expansion to other countries, with the Netherlands, Italy, Spain and Slovenia being the first focus markets.

Treatment of amblyopia has a long history, but to date, no truly innovative treatment options have been developed. Caterna Vision Therapy represents an innovative easy to use and complementary treatment option for lazy eye. It makes for a happy life for kids and their parents.

**„We are enthusiastic about the Caterna therapy: our 6-year-old son was able to quickly improve his visual weakness, both through the initial treatment by the ophthalmologist and through the training at home – and from his point of view he was literally just playing"**

*Maren and Lars Wesselhöft*

caterna

## KEY FACTS

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|---|---|
| **Foundation:** | 2013 |
| **CEO:** | Michael Scherrer |
| **Investors:** | Peppermint Venture Partners, KFW and Investitionsbank des Landes Brandenburg |
| **PVP Role:** | Lead investor A round, first investment 2014 |
| **Product:** | Online stimulation therapy for lazy eye |
| **Status:** | CE-marked as class I medical device, reimbursed by health germany insurance company |

**www.caterna.de**

# CEVEC: REVOLUTIONIZING INDUSTRIAL PROTEIN AND VIRAL VECTOR PRODUCTION

**In May 2015, the public health authorities in Brazil confirmed a rising number of Zika virus infections. In a few months, the virus spread from South to North America, and to some European countries. The last confirmed cases were reported in India in May 2017, according to the World Health Organization. This is how viruses work: they don't wait, spread quickly and require fast intervention to prevent pandemics. Two problems can occur in these cases: lack of a vaccine and slow vaccine production that does not meet the demand on the market fast enough. It's not just vaccines; new methods of drug production are desperately needed in times where precision medicine is progressing, with the discoveries of new and newly targeted biological therapies. Developing innovative ways to produce gene-therapy vectors and recombinant proteins more quickly and safely is what CEVEC Pharmaceuticals has been doing for over 15 years.**

More specifically, CEVEC Pharmaceuticals has been developing high-quality platforms for the efficient and safe production of glycosylated proteins, viral vaccines and gene therapy vectors. The unique and proprietary human cell-based production system has been branded as CAP® Technology with the recent successful introduction of the novel specialized cell-lines CAP®Go and CAP®GT.

The company is working with Biotest, a well-known German pharmaceutical company, on the development of recombinant blood coagulation factors to treat hemophilia patients. Among other projects they partnered with NewLink Genetics to use their virus-producing cell lines CAP-GT to create a new vaccine against the Zika virus. This development is in progress.

When the current CEO/CSO, Nicole Faust, joined the company in 2011, the CEVEC team counted around 20 specialists and had moved away from adenoviral gene therapy vector production towards recombinant protein production. As Nicole Faust explains, when the gene therapy field was suffering from setbacks, CEVEC focused on developing the CAP-Go technology, which allows efficient production of high quality recombinant glycoproteins (e.g. blood coagulation factors and other plas-

ma proteins). With the gene therapy field regaining momentum over the last few years, CEVEC is again exploring the initial purpose of the CAP cells and is developing the CAP-GT platform for safe and scalable production of gene therapy vectors – not only adenoviral, but also lentiviral and AAV vectors.

A lot of progress has been made in the field of recombinant technologies in the last 20 years enabling cell-based production in the laboratory without the need for human blood or tissue donations. The current world market for cell expression systems for the production of proteins in research and drug development has grown to 1.7 billion euros with annual growth rates of over 12% (2017). So what is it about the CEVEC`s CAP® Technology that makes the difference? "Most human production cell lines are adherent, meaning they require a substrate to grow on. CAP cells grow in suspension, making it easier to scale up the process and lower production costs," explains Faust. In essence: more people could benefit from different therapies potentially becoming more affordable.


A very promising future application of the CAP®-technology lies in efficient production of exosomes, microvesicles the body seems to use to transport information in the form of proteins or RNA between cells and tissues. Researchers are exploring the potential of this mechanism and its potential for an even more precise, targeted drug delivery, with far lower side effects compared to current therapies. CEVEC is exploring the potential of CAP cells to serve as a producer cell line for such modified exosomes. Initial results are promising.

The company will be raising a D-round of up to EUR 10 million in 2018.

**"There is a growing need for faster production and lower production costs of recombinant proteins, gene therapies and vaccines. This is what CAP Technology enables."**

*Nicole Faust (CEO/CSO)*

cevec

## KEY FACTS

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|---|---|
| **Foundation:** | 2001 |
| **CEO/CSO:** | Nicole Faust |
| **Investors:** | Peppermint Venture Partners, Creathor Venture, NRW.Bank, KFW & Business Angels |
| **PVP Role:** | Lead Investor C round, first investment 2012 |
| **Product:** | Human cell expression system, CAP technology platform |
| **Status:** | Marketed products, international customers in the biotech and pharma industry |

**www.cevec.com**

# CRYOTHERAPEUTICS: PARADIGM SHIFT FOR TREATMENT AND PREVENTION OF HEART ATTACKS

**There is no denying that the invention of stents to treat blockages causing heart disease (CVD) was a major breakthrough in cardiology. After all, cardiovascular disease is one of the main causes of death globally. Four-in-five of these deaths is attributed to heart attacks and strokes, according to the World Health Organization. As the world and medical industry was looking at how stents could be improved to benefit CVD patients, Dr. John Yianni looked the other way. He looked at completely different solutions for the treatment of heart attacks. What if we could treat inflammation responsible for the formation of plaques in the coronary arteries, which are one of the indications for stent placement in the arteries? This was the first idea for Cryotherapeutics in the early 2000s. Sharing his vision about the potential of cryotherapy for the treatment of heart attacks, cardiologist Dr. Maurice Buchbinder from Stanford joined Dr. Yianni and together they founded a company in 2009.**

What current treatments for heart attack patients such as stents lack is addressing the underlying pathophysiology of ruptured lesions. This often result in a number of additional problems, such as re-narrowing of the vessel, a need for aggressive and long-term drug regimens and a significant risk of future heart attacks. CryoTherapeutics is the first company worldwide addressing this unmet medical need by efficiently treating the causative plaques in the coronary arteries.

A proprietary cooling technology, which is used to trigger a healing process in the inflamed area of the vessel was designed by a team of clinicians, scientists and engineers with a successful track record of innovation in the MedTech industry. The cryo system used by interventional cardiologists consists of a console providing fast cooling of a balloon catheter at temperatures of -10 °C to -20°C at the site of the plaque in the coronary artery. The efficiency of such cryo treatment to stabilize these types of plaques has been successfully demonstrated in a pre-clinical study in the gold-standard animal model for atherosclerotic plaques.The next step is a clinical study in humans.

**"What we want to do in the long term is prevent heart attack from occurring in the first place."**

*John Yianni (CEO)*

A collaboration has already been established with hospitals in Sweden. A pilot clinical study will commence in the final quarter of 2017 to show safety and feasibility of cryotherapy to treat ruptured, non-stenotic lesions in patients who have suffered a heart attack, which would protect the patient from future coronary events.

Dr. Yianni, who developed technologies for managing cardiovascular disease for more than 20 years before co-founded Cryotherapeutics, is optimistic. His history in cardiology research is marked with significant successes. His career began in a startup bringing the first drug coated stent on the market, then continued in a company working on a diagnostic tool for detecting inflammation inside coronary arteries. "During this activity I started thinking what good is a diagnostic tool if you don't have a therapy or solution once you detect inflammation?" Dr. Yianni recalls his thinking in the early 2000s.

His vision for the development of Cryotherapeutics represents a major breakthrough. The technology is about to be tested in clinical studies in humans. With the successes in proprietary technology development the vision for Cryotherapeutics has evolved significantly since its beginnings. "In combination with new diagnostic tools for artery inflammation detection, Cryotherapeutics could potentially help prevent heart attacks in the future. It might even replace the use of stenting in a segment of patients with a high risk of a heart attack," says Dr. Yianni. Currently no other competitors in the segment are visible or emerging and CryoTherapeutics has secured a strong IP position in the field.

The company will be raising a C-round of up to EUR 15 million in 2018.

Cryotherapeutics

## KEY FACTS

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| **Foundation**: | 2009 |
| **CEO:** | John Yianni, PhD |
| **Investors:** | Peppermint Venture Partners, HTGF, KFW, NRW.Bank, Creathor Venture, Getz Brothers & Business Angels |
| **PVP Role:** | Coach for HTGF Seed Investment, Lead Investor A+B round, first investment 2013 |
| **Product:** | Class III medical device, cryo system with console and novel catheter |
| **Status:** | The cryo system is currently in a first-in-man clinical trial with a 20 patient pilot phase |

**www.cryotherapeutics.com**

# EMPERRAS INTEGRATED DIGITAL DIABETES CARE SYSTEM: DECREASING THE DISEASE BURDEN AND IMPROVING QUALITY OF LIFE OF PATIENTS WITH DIABETES

**It is difficult to imagine the feeling, after the doctor says your results show you are in danger of going blind, suffering from kidney failure, heart attack, stroke or lower limb amputation if you don't make immediate lifestyle changes and start lifelong medication. This is what people with diabetes are faced with after diagnosis. What follows for many of them are constant worries as they focus on monitoring and recording food intake, blood glucose levels, insulin doses and lifestyle interventions. Knowing this to be stressful and time-consuming drove the Emperra team to build a solution which would make it easier for patients with diabetes requiring insulin. In 2008, the company designed a revolutionary digital diabetes management system called ESYSTA.**

ESYSTA® is the world's first digitally integrated diabetes management system. It consists of a proprietary Smart Insulin Pen, a Blood Glucose Monitoring System, and professional software and app. Patients' blood glucose measurements and the injected insulin doses are automatically and wirelessly transfered to an online cloud platform, where a data analysis is carried out by algorithms, giving the patient feedback information on how to manage the disease. Since the caregivers – doctors and nurses – can access the data too, they can monitor if the patient is reaching the agreed targets and suggest corrective actions

when needed. ESYSTA has CE certification in Europe and FDA approval is in process.
The efficacy is clear. A 12-month study of more than 200 patients demonstrated that the use of ESYSTA led to a significant improvement of glycemic control measured by indicator HbA1c. Glycated hemoglobin (HbA1c) values range between 4.0% and 5.6% in healthy people and are above 6.5% in people with diabetes. In the study with ESYSTA, HbA1c was lowered by 0.9% on average and for people with Type 2 diabetes the average HbA1c was lowered by 1.2% without changing the medication. There were no increases in hypoglycaemia, which leads to fewer hospitalizations and provides for instant cost savings. Furthermore, it is documented that such a decrease in HbA1c leads to significant reductions in costs connected with treatment of diabetes-related late complications.

The complete system is reimbursed regionally with selective contracts with health insurance companies paying not only for the hardware but also for telemedicine, data management as well as outcomes based payment.

This is also why the CEO of the company, Bent Johnsen, is confident Emperra could impact diabetes care globally. As he says: "Diabetes type 2 is reaching pandemic proportions and the healthcare systems are currently not capable of coping with the enormous growth in people with Type 2 diabetes. ESYSTA improves the state of the disease for the patient through self management. In addition, it is shown to have an economic benefit to the payer by using this digital diabetes management system."

The number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014, according to World Health Organization (WHO) statistics. By 2040 the number is expected to rise to 642 million, according to the International Diabetes Federation. Emperra's story is therefore only beginning. Millions of data points (blood glucose and insulin) have been generated from more than 500 patients using ESYSTA, expanding the company's vision, as the outcome data can be used to offer a capitated payment model for the whole diabetes (out-patient) product supply as well as risk sharing and outcomes based payments.

Emperra is looking to raise up to 15 million euros in capital in order to accelerate the development and growth of the company.

Emperra®
E-Health Technologies

## KEY FACTS

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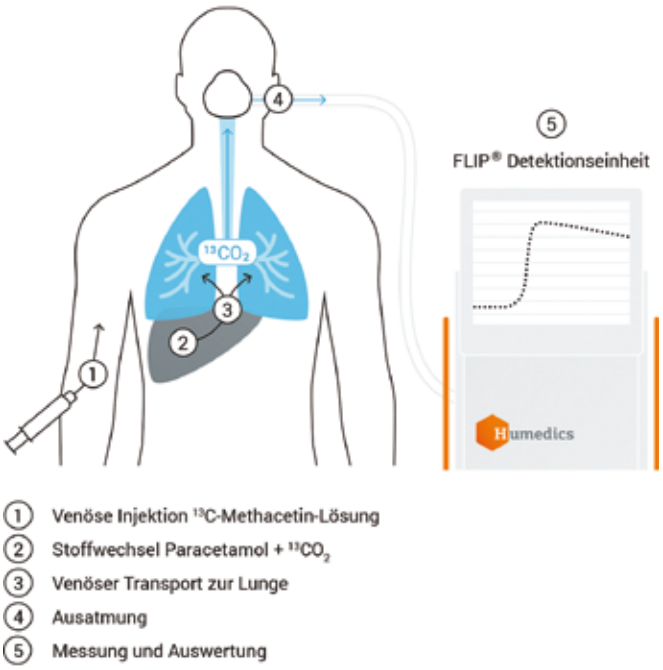
| **Foundation:** | 2008 |
| **CEO:** | Bent Johnsen |
| **CTO/CMO:** | Dr. Janko Schildt |
| **Investors:** | Peppermint Venture Partners, ILB, Robert Bosch Venture Capital & Business Angels |
| **PVP Role:** | Lead Investor A+B round first investment 2013 |
| **Product:** | Cloud based digital diabetes management system: Smart insulin pen and blood glucose monitoring system |
| **Status:** | CE-marked, all ISO certifications needed in place, test-launched in Germany, reimbursed and selective contracts, FDA 510 k approval under way |

**www.emperra.com**

# HUMEDICS AND THE LIMAX TEST: REDEFINING STANDARDS OF CARE ACROSS THE SPECTRUM OF LIVER RELATED ILLNESSES




**After working internationally for over 30 years in top level executive positions within the established Medtech industry, Karsten Damgaard-Iversen learned about Humedics and its novel LiMAx test for measuring functional liver capacity. He was immediately captivated by the huge potential of this innovation. "What is so revolutionary about the LiMAx test is that it is a truly new diagnostic modality that delivers real-time clinically relevant and highly actionable information. It therefore has the capacity to permanently change standards of care across the entire spectrum of liver related illnesses", he says, referring to the clinical study data generated so far with the LiMAx test.**

He became the CEO of Humedics in June 2017, motivated by a strong urge to help ensure that this important innovation would successfully enter the global market.

"LiMAx is the first accurate in-vivo diagnostic liver test that provides us with essential and previously unavailable data on functional liver capacity", Iversen comments further. The prevailing methods for assessing liver function are all indirect and all inherently inaccurate. They include blood chemistry, ultrasound scanning with elastography, as well as other imaging techniques such as CT and MRI. The current so-called gold standard for liver function assessment is a core-needle biopsy. This is a potentially painful procedure which involves certain risks, and the examination of the extracted tissue specimen(s) is ultimately associated with both intra- and inter-observer variability.

When liver surgeons have to decide whether to perform a liver resection or not, they currently lack the information necessary to minimize avoidable postoperative complications. The LiMAx test is changing that. Research on thousands of patients already conducted at over 20 top clinical centers across Germany has shown that informed decisions taken based on the results of the LiMAx test can reduce the danger of liver failure after liver resection by as much as 60%. Forty peer reviewed publications further confirm the unique added value of the LiMAx test.

What is unique about the LiMAx test is that, unlike other tests, it allows precise real-time liver function capacity assessment. The test works by direct inducement of liver metabolism. The patient receives a Humedics patented non-radioactive and isotope-labeled

drug, 13CO2 Methacetin. This is metabolized in the liver by the CYP1A2 enzyme which turns the drug into 13CO2 and Paracetamol. The change in the concentration of 13CO2 in the patient's breath is measured through the LiMAx test mask, which channels the exhaled air to the ultra-sensitive laser spectroscopy system in the main console of the LiMAx system. The LiMAx system can detect the extremely low concentration of 13CO2 contained in each breath. 13CO2 Methacetin is expected to get official marketing authorization in several European countries before the end of 2017, upgrading Humedics from a medical device start-up company, with annual revenues of about EUR 650K in 2016, to a Diagnostics company with a huge market potential and the opportunity to establish the LiMAx test globally.

The test was designed by Prof. K. Heyne (Free University of Berlin) and Prof. M. Stockmann (Charité Universitätsmedizin Berlin) in 2006. The first steps were taken at the Free University and at the Charité in Berlin before the two inventors got together with Wilfried Heyne and all three became the founders of Humedics in 2009. PVP had already worked with the founders from 2008 to 2011, through its cooperation with the Charitè, before investing in Humedics as the lead investor of the A and B round, through its Peppermint Charité Biomedical Fund.

The current applications of the LiMAx test represent only the beginning of a much larger potential. As an example, the instantaneous accurate measurement of actual metabolic activity of the liver could redefine chemotherapy protocols, patient selection for liver surgery and usability of donor livers for liver transplantation, as well as, stratification of patients and monitoring of therapy effects on NASH patients.

Humedics is launching its next round of financing to fund future growth, geographical expansion and preparations for the registration and validation of the LiMAx test with the U.S. Food and Drug Administration

The company is looking to raise EUR 12 million in equity and debt financing.

Humedics
redefining liver function

## KEY FACTS

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| **Foundation:** | 2009 |
| **CEO:** | Karsten Damgaard-Iversen |
| **CTO/CMO:** | Erwin de Buijzer |
| **Investors:** | Peppermint Venture Partners, IBB, KFW, Ventegis, Vesalius, Biomed Invest, Seventure |
| **PVP Role:** | Lead investor A+B round first investment 2011 |
| **Product:** | LiMAx test: Including the FLIP device, breath tube and mask as well as 13C methacetin i.v. solution |
| **Status:** | CE-marked, ISO 13485, 26 devices installed |

**www.humedics.eu**

# IMPLANDATA: AT THE FOREFRONT OF TRANSFORMING GLAUCOMA CARE

**It started in an automobile repair shop when one of the founders of Implandata was looking at a wireless tire pressure sensor. "We started thinking: how could we invent something similar for telemetric intraocular pressure (IOP) measurement? After all, the idea was already 30 to 40 years old in the medical community, but no one had designed and built an actual product for this purpose yet," remembers Max Ostermeier, CEO of Impandata looking back over the last ten years. It is of critical importance to continuously measure intraocular pressure: once the optic nerves are damaged, uncontrolled pressure can mean a difference between keeping your vision or going blind.**

The development of glaucoma, a group of diseases damaging the eye's optic nerve, depends on the level of pressure the optic nerve can tolerate before it gets damaged. The challenge is that the disease is silent until serious damage has occurred. After diagnosis, the treatment regime is based on the patient's intraocular pressure measurements made while at the doctor's surgery. After leaving the doctor's office, however, patients do not feel or have any easy means of detecting changes in their eye pressure. Achieving patient compliance and designing a personalized medication regime based on individuals' needs is therefore difficult. Implandata has the answer.

The company's product – EYEMATE – is the first wireless eye pressure sensor for Glaucoma patients. EYEMATE enables the patient to measure IOP repeatedly on demand or continuously. Measurement data is then wirelessly transmitted to the patient's portable hand-held device. Recorded values can be

integrated into a mobile patient management system. The app connects the patient and the physician, allowing doctors to intervene when drug changes or dose adjustment are needed. EYEMATE gives the patient peace of mind and helps them achieve compliance based on real-time status of eye pressure.

EYEMATE received a CE mark this year. It is currently used by 50 patients, with the oldest implant being more than nine years old. So far, only patients requiring cataract surgery have received the implant because the sensor was implanted easily as part of the operation. This prevented a need for a stand-alone invasive procedure. Thanks to the advance of technology, Implandata is designing an even more convenient product – an even smaller sensor that the ophthalmologist can implant by injection without the need of a surgeon. This innovation is expected to be at market ready stage in the next 18-24 months.

"If I had known ten years ago that the development process was going to be so long, I would have reconsidered getting into this project," says the CEO today. "What always kept us going, though, was the constant encouragement from ophthalmologists, always emphasizing the improvement it brought in patient care. We also got a lot of positive feedback from patients themselves. It is disturbing to know you might go blind and that you do not have adequate control over preventive measures. EYEMATE gives patients peace of mind," says Max Ostermeier. Just as continuous glucose monitoring brought about a revolution for diabetic patients, Implandata's implantable eye pressure sensor radically improves treatment of glaucoma patients.

The company is currently raising a C-round of up EUR 12 million.


IOP
Implandata Ophthalmic Products

## KEY FACTS

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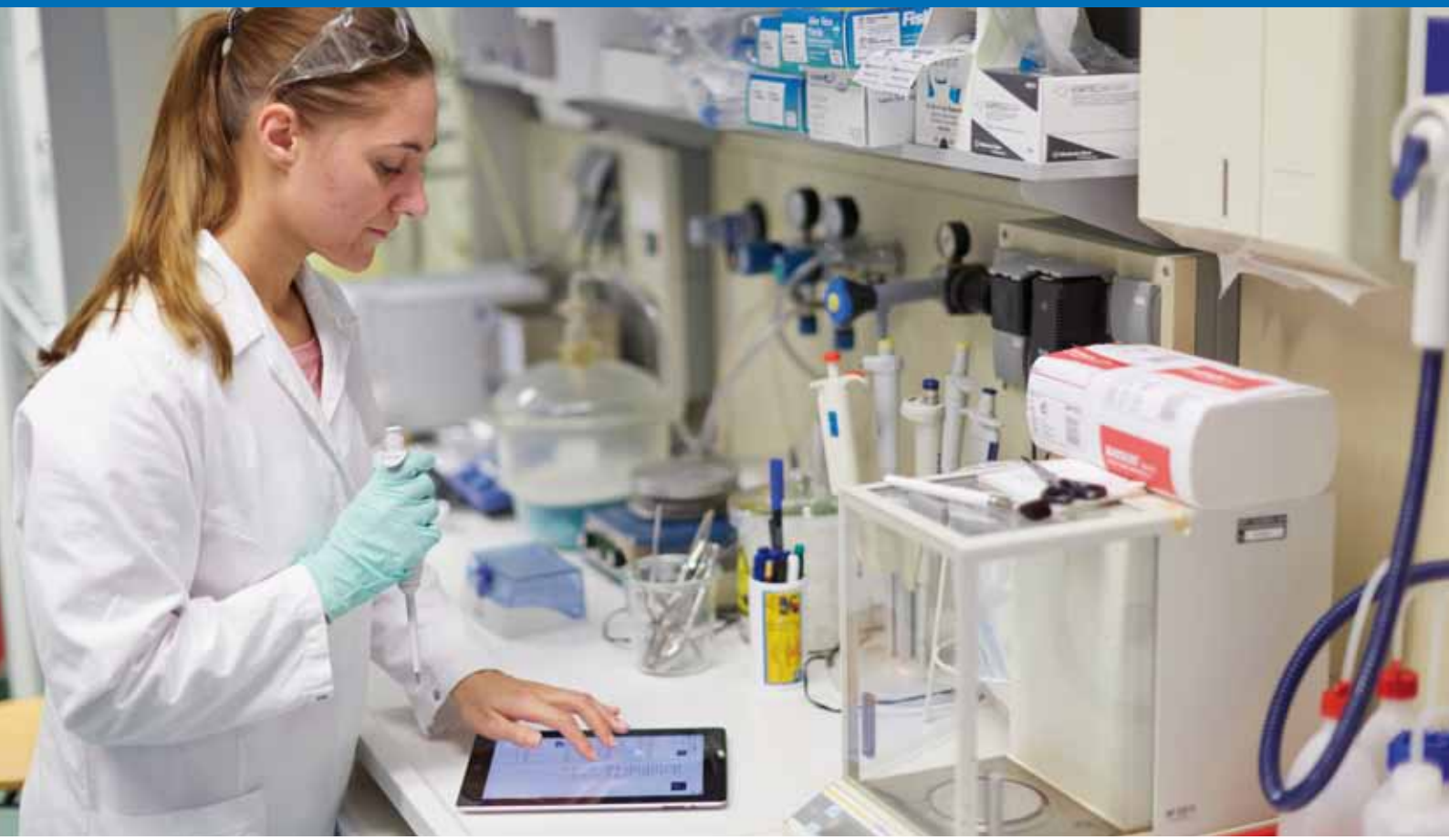
|---|---|
| **Foundation:** | 2010 |
| **CEO:** | Max Ostermeier |
| **Investors:** | Peppermint Venture Partners, HTGF, KFW, HBF & Business Angels |
| **PVP Role:** | Lead Investor A+B round first investment 2012 |
| **Product:** | Class III medical device, sensor with handheld device, software and digital frontend |
| **Status:** | EYEMATE clinically validated, CE mark for EYEMATE, 45 patients |

**www.implandata.com**



# LABFOLDER: BRINGING LABORATORY RESEARCH INTO THE 21ST CENTURY

**When Simon Bungers entered a laboratory at the Max-Planck-Institute of Experimental Medicine to start the research part of his PhD, he was quickly faced with the inefficiency of research data management at the laboratory. Most findings were recorded manually in paper notebooks. Searching previous findings was very difficult without help, all of which left the new researcher feeling frustrated.**

By the time he finished his PhD in 2010, the revolution of online platforms was in its early stages and Bungers recognized a better system, using the latest technology, could benefit the research community greatly. Together with Florian Hauer, a fellow researcher at the MPI of Biophysical Chemistry, he started working on the idea of a productivity platform for structured data aggregation that would make analysis and collaboration among researchers easier. In 2012, labfolder was founded and has grown to more than 15,000 users today.

labfolder is a well-designed productivity platform for research teams, supporting scientists in their quest for groundbreaking discoveries. One of the important features of the solution is access to negative results – experiments that did not work – which are usually not easily accessible to researchers. labfolder makes it simple to create, find, share, discuss and validate research data as a team and covers all the relevant tasks, from experimental planning to data collection, recording and organizing all the laboratory work. In addition, an open API puts labfolder at the center of lab automation by allowing the integration of different laboratory instruments, devices and equipment as well as materials and in-

ventories. In combination with a modular architecture that can use either proprietary or a user generated application module (LAPPs), labfolder has the potential to become the lab operating system of the future.

Beginning in 2014, the company now offers two solutions: a standalone server solution and a cloud version which allows its customers maximum flexibility in handling their data.

"One of our main successes is that we have managed to build an international scientific network of various academic institutions and industry researchers, allowing them to easily discuss and improve results," Dr. Bungers explains today. Among others, it is used by the Max Planck Society, Charité Berlin, academic as well as industrial and pharmaceutical scientists in R&D, analysis, and production labs. New institutions are joining all the time. Where it took 200 days to convince new customers to try the system two years ago, today it takes only 50 to 60 days. In general, digitalization in the laboratory has been fairly slow, however the need for quality management of scientific data is rising. „In five years' time lab notebooks are expected to become the norm, enabling higher quality of research, and we are at the forefront of this development," says Dr. Bungers.

In the coming months, labfolder will also benefit from support and networks in the US and the pharma industry following selection for Merck Group´s global Accelerator in Darmstadt and German Accelerator Life Sciences (GALS) in Boston.

The company will be raising a B-round of up to EUR 2.5 million in 2018.

**„One of our main successes is that we have managed to build an international scientific network of various academic institutions and industry researchers, allowing them to easily discuss and improve results."**

*Simon Bungers (CEO)*

labfolder

## KEY FACTS

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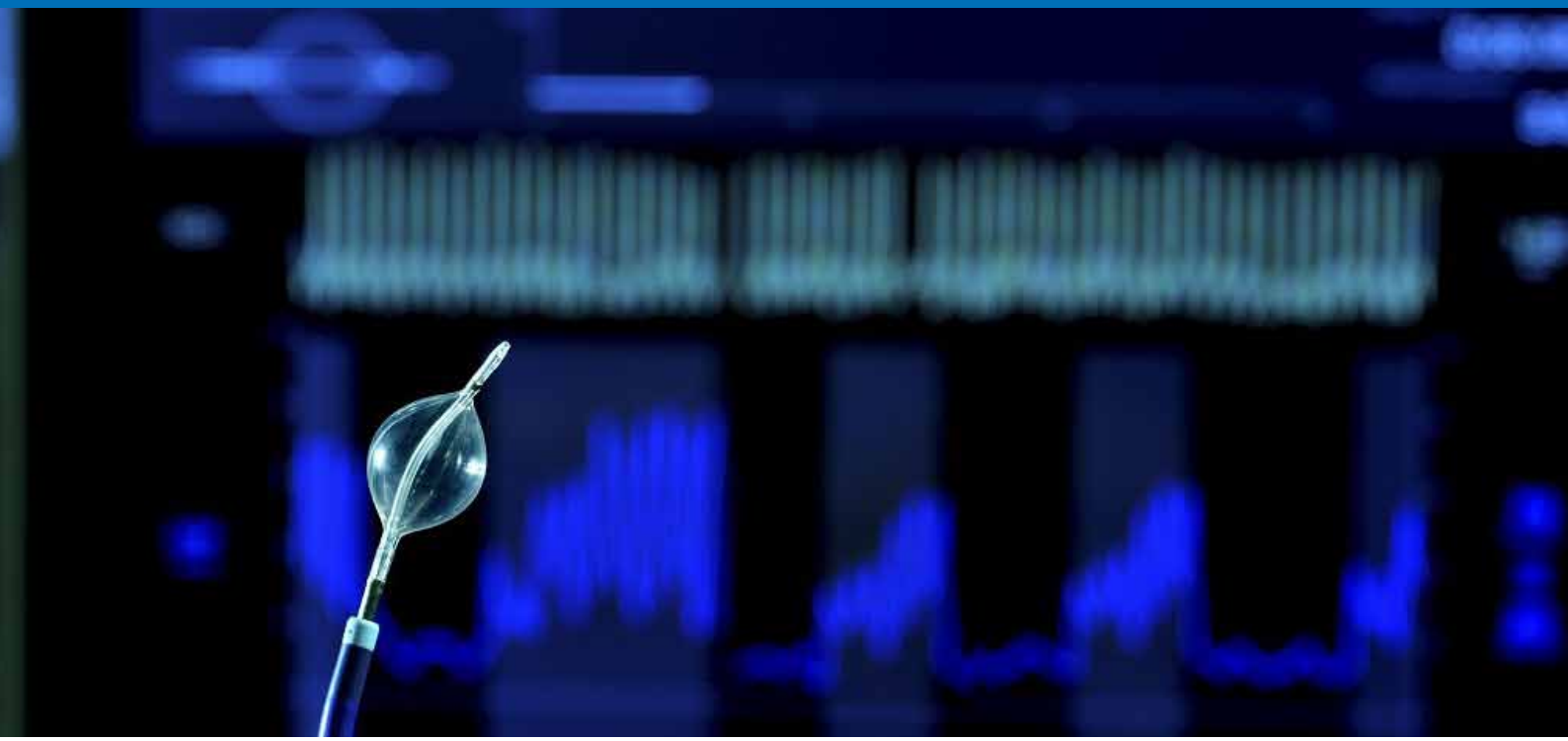
|---|---|
| **Foundation:** | 2013 |
| **CEO:** | Simon Bungers, PhD |
| **CCO:** | Yannick Skop |
| **Investors:** | Peppermint Venture Partners, IBB Bet., Vogel Ventures & Business Angels |
| **PVP Role:** | Lead Investor A round, first investment 2015 |
| **Product:** | Digital Lab Notebook Platform, SaaS |
| **Status:** | Marketed product, 15,000 international scientists use labfolder currently |

**www.labfolder.com**



# MIRACOR: HELPING THE HEART RECOVER

**Imagine being trapped underwater, slowly running out of air with each second. Without oxygen, the lungs fill with water and the body begins to shut down. Much the same happens to the heart in the event of a heart attack: the artery gets blocked, the heart stops receiving oxygen, and this causes acute myocardial infarction (AMI).**

For the patient, initial discomfort in the chest turns into a terrifying pain coupled with paralysing fear. Immediate medical care is required, but even when fast treatment is at hand, the consequences are permanent: life-time drug therapy, potentially accompanied by post-operative complications.

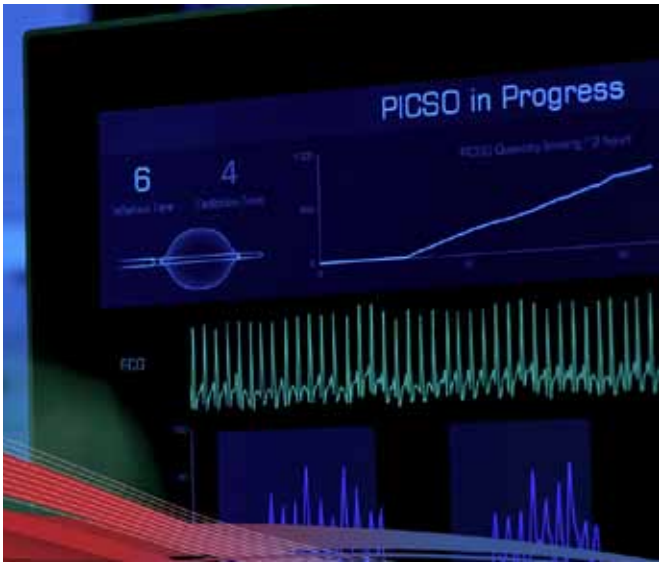
There are 32.4 million myocardial infarctions and strokes worldwide every year and so scientists are working hard to find new ways to prevent and treat AMIs.

Miracor's PiCSO® Impulse System is the first and only coronary sinus intervention system designed to improve cardiac function, reduce infarct size, and potentially prevent the development of heart failure following acute myocardial infarction. Admittance of the patient to the emergency room is followed by percutaneous coronary intervention (PCI), a minimally invasive procedure for treating the narrowing (stenosis) of the coronary arteries. When the PiCSO® system is applied in addition to PCI, a catheter is placed in the coronary sinus. Once the PISCO balloon is inflated, it temporarily occludes the hearts venous outflow. This creates an immediate increase in coronary venous pressure, thus improving micro circulation and reducing the infarct size following an AMI.

As explained by the CEO of Miracor Olivier Delporte, 170 patients have been treated with the system so far. Initial clinical studies have shown that even heart failure patients may benefit from only short periods of PiCSO due to the improvement of structural integrity and induction of regenerative pulses. Based on this, further research activities are currently planned to review the potential in the treatment of heart failure patients. The hypothesis is that the PiCSOHF Therapy could reverse the adverse mechanisms of the failing heart.

The idea behind the PiCSO® intervention has a long history, however, no product that was proven safe and clinically tested had been designed and developed for the market until 2008. This is where Miracor stepped in. It was co-founded by the innovator of the PiCSO® concept, Professor Werner Mohl, a long-time cardiac surgeon at the Medical University of Vienna. In almost ten years, the solution gained serious recognition in the cardiology community, attracting top specialists to the Scientific Board of the company, such as Gregg W. Stone, the Director of Cardiovascular Research and Education at the Columbia University Medical Center, and Antonio Colombo of the Centro Cuore Columbus in Italy. The product subsequently received several innovation awards and got its first CE mark of approval. PVP stepped in with an investment in 2016.

The year 2018 is expected to be an exciting one for Miracor: as well as finalizing CE re-certification, clinical results will be published of two studies that are now fully enrolled, a European Randomized Trial is planned, and FDA approval for a clinical trial in the U.S. is expected. To make all this possible and continue moving to market launch, the company is currently raising a D-round of up to EUR 17 million.




**„Our next milestone will be the CE Mark and the publication of the results of the two recent clinical studies. We‘ve shown through extensive trials that PiCSO improves clinical outcomes for patients suffering from AMI. Once on the market, PICSO will allow the many patients who suffer heart attacks to fare better afterwards.”**

*Olivier Delporte (CEO)*

miracor medical systems

## KEY FACTS

| | |
|---|---|
| **Foundation:** | 2008 |
| **CEO:** | Olivier Delporte |
| **Investors:** | Peppermint Venture Partners, Earlybird, Delta Partners, BioMed, SHS, AWS |
| **PVP Role:** | Lead Investor C1 round, first investment 2016 |
| **Product:** | Medical Device Class III, PiCSO Impulse System for heart attack recovery |
| **Status:** | Ongoing CE-mark trials, more than 170 patients treated |

**www.miracormedical.com**

# OUTLOOK

**Venture Capital is not a job for the faint-hearted. Failure rates of startups are high. But seeing 300-400 startup ideas a year since PVP's foundation, the number rising last year to 600, has given us a deep insight into industry trends.**

A lot has happened in medical technologies in the last decade. The last five years, in particular, have seen the dawn of digital transformation in the healthcare industry – the last bastion of resistance to digitalization. However, hopes that consumers would be easily persuaded into buying digital products or subscribing to digital solutions for their health, proved to be misplaced. B2C models have been more difficult to tackle than many expected. Knowing that patients, especially those in public healthcare systems, would expect reimbursement for the use of solutions for disease management, many startups have pivoted to B2B or B2B2C models.

We have gained a great deal of expertise in what kind of business models do not work. Nevertheless, a lot of hope rests in the future for direct to consumer products. The flood of medical and health apps on offer is slowly being filtered through validation platforms that enable users to find out which ones have been graded and approved by medical experts.

We see innovation shifting toward maximum connectivity of stakeholders in healthcare. Integration of IoT, medical devices and monitoring platforms enriched with artificial intelligence – innovators are searching for ways to make looking after your health as seamless as possible for the end user. Reimbursement models are moving in the direction of performance payments bringing new challenges for startups where it is not the hardware but the outcome that is paid for.

With rising costs in healthcare making systems unsustainable, we expect healthcare systems only to adopt solutions with proven cost advantage and added value. Therefore, going forward we will be focusing especially on the intersection of medical technologies with digital solutions. Our sweet spot in this area is business models that combine the advantages of hardware – i.e. patent protection, for example sensors – with software and apps (digital front-end), and which additionally enable the involvement of all stakeholders in monitoring compliance while improving patient engagement and allowing for datamining.

The things that has always kept us going in the domain of healthcare is the opportunity to be at the cutting edge of innovation, constantly meeting and working alongside interesting people, and getting the sense of living five years in the future. We will therefore continue to seek out the most promising innovations in the medical technology and digital health space through our new fund, which we aim to launch in 2018 with a target volume of up to EUR 100 million.

With the new fund, PVP is also transforming into a pan-European investment company, adding a new Swedish partner and opening a satellite office in Lund in the Medicon Valley, spanning the Oresund Region of eastern Denmark and southern Sweden. Adopting a more international investment outlook we intend to support 10-15 new companies across Europe as well as selectively in the US. We will still search for solutions with evidence, however also increasingly tapping into the puzzling domain around consumer models.

There are many needs remaining to be addressed properly in the current healthcare system. This can be achieved through further innovation and digital transformation. It is gratifying to be able to help accelerate that process.

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