MADE IN HOLLAND
LIFE SCIENCES & HEALTH

Medical breakthroughs • Made-to-measure care • New technology
Quicker cures • Staying healthy • Improved treatment
'They will find something'. The hope that people with life-threatening diseases have placed in science is huge. How can we bring discoveries in medical science to the bedside of patients as quickly as possible? Dutch hospitals, universities and companies work together within the Centre for Translational Molecular Medicine (CTMM) to realise quick diagnoses and made-to-measure treatment, so as to make people less ill and to improve the quality of life. Project Volta of CTMM puts an end to the suffering of undergoing chemotherapy, radiation and surgery for women with breast cancer. Concentrated sound waves burn away tumours from the outside and spare the surrounding healthy tissue. www.ctmm.nl
Welcome

Focus on the person, not on the illness. In the Dutch health care sector, that is a matter-of-course. Health is not a lack of an ailment. It is the manifestation of the ability to adapt and self-manage. The Dutch top sector Life Sciences and Health represents companies and institutes and stimulates people to take more control of their own lives and bodies. This is possible thanks to pioneering technological innovations and breakthroughs in biological research. It is a tradition in the Netherlands that goes back to the sixteenth century. But it is precisely now that we see a growing demand for inventions of this kind, because people now live longer and healthier lives and certain illnesses occur more often. Hospitals, knowledge institutes and the Dutch government are working to meet that demand, together with multinationals and start-ups, which rest on that one brilliant idea for a healthier world. Put your finger on the pulse and work with us.
In the spotlight

Photo: Bart van Overbeeke
We lead increasingly longer and healthier lives. And we have it more and more in our own power to do so. Thanks to our healthy lifestyle, the life expectancy of the Dutch is higher than ever. In 2010, the average life expectancy at birth in the Netherlands was 78.8 years for males (68 years worldwide) and 82.7 years for females (73 years worldwide). Until the year 2050, the life expectancy in the Netherlands is expected to increase by another six years. It can’t be said, unfortunately, that we therefore require less health care, and the government is simultaneously introducing cutbacks on care. In order to relieve the pressure on the health care sector and to stimulate self-management, companies introduce e-health devices to measure insulin level and medication intake. For example the smart pillbox has a special registration system that keeps track of whether the patient takes his medication on time. Sensors in the housing measure down to the ml how much medication is still in the pillbox. This information is sent to the physician via a 3G internet connection. If the pillbox is not opened within the time period agreed upon, the patient will automatically receive a text message reminding him to take the medication. Fewer investments are lost because of this innovation, as extra medication need not be supplied unnecessarily.

www.adheretech.com

Curing instead of providing care. Some people require more care than others because of illness or old age. What if we could make these people better instead of just taking care of them? Regenerative medical science makes it possible in the future to completely restore the body’s own tissue that is damaged due to illness or wear. This results in revolutionary new treatments of, for example, chronic and geriatric diseases. This innovative form of medicine still requires extensive research and close cooperation between various parties. A Euregional institute in the field of regenerative medicine is to be established on the Chemelot Campus in centrally situated Geleen in the province of Limburg. The project CHaRM (Chemelot Health Campus association for Regenerative Medicine) is to bring the knowledge and expertise of public and private parties from the region, the Netherlands, Europe and the world together under one roof. Intensive cooperation of this kind will accelerate the development of new technologies. The individual participants do not dispose of all of the necessary knowledge themselves, but can easily share their knowledge with others in this way. And so on a regional level, we work together on an international level to find cures. www.ledbrainport2020.nl

Staying healthy with a little help

Forever young?
In the spotlight

Photo: HH/ Corbis
Nutrition plays an important role in the well-being and health of the population. As we go from one phase of life to the other, our body needs different building blocks. The elderly and newborns, for example, have different nutritional needs. Our food supplies energy, which is why it is wise to opt for nutritious foodstuffs. On a global level, we can observe a transformation in the food culture in which healthy food is becoming increasingly important. Children in particular are an important target group in this respect. If they are taught to eat healthy foods at a young age, then they will be more inclined to do so for the rest of their lives. Food manufacturers are responding to this development with ‘personalized nutrition’. Nutricia, a division of Danone, has developed a special medical formula for babies and infants. For those with growth retardation or a metabolic disorder, for example. But in the case of food allergies, such as a milk or gluten allergy, Nutricia offers a solution. The composition of the medical formula has been adapted such that certain elements have been removed or are offered in a form that the body can tolerate and absorb. This special formula is frequently used in hospitals, but is available to parents on prescription. www.nutricia.nl

The Netherlands offers favourable limiting conditions where it concerns working together. A good infrastructure is one example of that. We can furthermore dispose of an extensive network of professional bio banks, where body materials have been prepared for biomedical research. We also have laboratories and facilities in the sphere of vaccinology in large numbers throughout the country. We would like to know which factors determine whether someone will grow old in a healthy manner. When do geriatric diseases occur and when do they not? This requires large-scale scientific research, possibly in the Netherlands. As of 2006, the project LifeLines has monitored the health of 165,000 persons in the northern region of the Netherlands and will do so for a period of thirty years. The data collected from all of the questionnaires, physical tests and screenings will enable the largest study into ageing and staying healthy. It is one of the largest studies of its kind on a global level. Thanks to the large number of genetically related participants, this scientific research can provide us with information on combinations of hereditary and environmental factors. In this way, LifeLines contributes to developing an effective diagnosis, prevention, treatment and monitoring of chronic diseases. www.lifelines.nl
A healthy perspective

When it comes to Life Sciences and Health, the Dutch have both a proud heritage and a promising future. The Netherlands is buzzing with innovations that will improve the world’s health.

115 years

Hendrikje van Andel-Schipper lived through three centuries! The oldest Dutch woman to have ever lived in the Netherlands and also one of the world’s oldest people. She was born in 1890 and died in 2005.

Close care

With approximately 400 innovative life sciences companies within a 120-mile radius, the Netherlands boast the most concentrated region in the world when it comes to creating economic and social value in Life Sciences and Health.

Dutch health care ranks number one compared to the US, Australia, New Zealand, Germany and Canada.
Nearly 50 percent of Dutch life sciences companies generate turnover from export in the form of, for example, technology, diagnostic and therapeutic products and ingredients for foodstuffs and cosmetics.

Between 2006 and 2010, the members of the Task Force Health Care (medical technology) realised over 250 large health care projects abroad (75 percent in Asia and Africa) with a combined worth of € 700 million.

5 of the top-10 biotech deals within the EU in the last 4 years involved Dutch companies.

25,000 professionals

Dutch R&D activities in the life sciences & health branch provide jobs for 25,000 people. Their turnover is € 18 billion a year. About 3,800 organizations are active on a broader scale, comprising hospitals, production facilities and wholesalers. Together, they employ an additional 98,000 people and generate an annual turnover of € 54 billion.

Nearly 50 percent of Dutch life sciences companies generate turnover from export in the form of, for example, technology, diagnostic and therapeutic products and ingredients for foodstuffs and cosmetics.
‘Cooperation distinguishes us from others’
Rob van Leen is the figurehead of the Top sector Life Sciences & Health (LSH). He is Chief Innovation Officer at the chemical and biotechnology company DSM.

www.lifescienceshealth.com

High-quality and affordable care

The Netherlands excels in medical research. Every Dutch university has a research department that is considered top-class on a global level, says Top sector figurehead Rob van Leen. “The main issue now is making the applications of innovations available to the patient as quickly as possible.” The Netherlands must be a world leader by the year 2025, with one of the most rapidly developing business communities in Europe. How do we go about that, without compromising the focus on the patient?

“How do we move up from research to use in actual practice?”

“Health care in the Netherlands is of a high quality. And because of our insurance system, the Dutch are not forced to take any risks with their health. Our system is good, but expensive. As a sector, we add on many new products and technology. You have to dare to make choices and to let go of old treatment techniques, as it will otherwise become unaffordable. We have a fantastic IT-infrastructure in the Netherlands. It is used to enable people to function independently longer, for rehabilitation purposes and to monitor patients. This is how we contribute to high-quality and affordable care.”

I hear cost control. Is that a typical Dutch approach?

“It is not only about the costs. In other countries, the emphasis is on the curative side of health care. In the Netherlands, being healthy is not the same as not being ill. We put the emphasis on taking care of yourself, on the ability to manage for yourself and on a healthy lifestyle. That is the future, other countries are making efforts to catch up, because the life expectancy is increasing all over the world.”

Are the Dutch solutions in keeping with the demand worldwide?

“We have a reputation of being progressive. Perhaps we pose questions in the Netherlands that are still unmentionable elsewhere. Regenerative medical science, in which parts of the body are reconstructed from cells and tissue, is a good example.

Should we want to do everything that we can do? If someone lives to the age of 83.3 years instead of 83, what will we have gained?
In the Middle-East and the United States, health care is a much more private affair. They make different choices in those countries. We are an egalitarian country. Here, the question is always whether or not an operation or a therapy is available to everyone. That too creates a typical Dutch view on matters and a focus on the patient. Is this more agreeable to the patient, but perhaps not very favourable to the specialists? In our country, we dare to put the status quo up for discussion.”

How is the LSH-sector taking the world by storm?

“By grouping knowledge and industriousness in the various regions, in a physical sense as well, and by cooperating with and towards countries abroad: the Netherlands as a single LSH-region. Nederland has always focussed on countries abroad by tradition. The Parkinson Centre Nijmegen, for example, is pioneering in its field. However, while the contacts with Germany and the USA had already been established, we were still at the start of the rollout in the Netherlands. We are truly a significant player on an international level, and so it is not surprising that the sector has considerable international ambitions. We sometimes even skip the Dutch domestic market, while it can serve as a good ‘experimental garden’.”

And who will realise these ambitions?

“Everyone already knows Philips and DSM. The four hundred small and medium-sized companies that make up the Dutch LSH-sector are the main driving force for research and innovation. They develop and market ideas and make deals with knowledge institutes and pharmaceutical multinationals. Our country has a culture of open innovation and adequate cooperation within public-private consortiums. Consider the broadness within the steering group LSH that plots the lines for the sector. It includes UMCs and colleges, but also health insurers and venture capital. I have never come across an organ of that kind abroad. Cooperation is genuinely a quality of the Netherlands.”
Huge step for Mindwalker

Mechanical motion and electronic control are a perfect fit in the Mindwalker, an external skeleton that is controlled by signals in the brain. The 'exoskeleton', developed by researchers at the technical universities of Twente and Delft, is attached around the hips of the paralyzed user and continues down to the bottom of the foot. A special nature is that the skeleton allows for steps of varying sizes and that the foot can be placed sideways, which is necessary for one to remain stable when walking. Mindwalker is faster than other skeletons and can be used without crutches. But the designers are not satisfied yet. In the years to come, they want to make the Mindwalker lighter, more flexible and controlled more intuitively.

https://mindwalker-project.eu/

New technology stops bleeding

Bleeding that occurs during an operation usually stops by itself, but that is not always the case. Fibrocaps is a special powder on the basis of fibrinogen. The doctor sprinkles the powder on the wound and the blood clots within two minutes. The Profibrix company developed this new product thanks to two Innovation credits from Netherlands Enterprise Agency that together total more than 10 million euro's. Following the approval of the USA and the EU, they want to introduce it on the market as soon as possible.

www.profibrix.com/fibrocaps/overview

Rehabilitating on top of a plane

You can rehabilitate in the traditional manner. But rehabilitating while balancing on top of a plane is all the more spectacular and, apparently, more effective. Motek Medical develops innovating hardware combined with virtual reality. Using a video screen, the patient enters a different living environment as an ordinary avatar. During a special training programme, creative elements are used to motivate patients and to help them focus less on their pain and limitations. The therapist can easily measure the progress of the patient via real-time feedback and can adapt the level of difficulty of the rehabilitation exercises where possible.

http://www.motekmedical.com

Setting sights on cancer

Positron Emission Tomography (PET) is increasingly improving our insight into tumours. Thanks to PET-scanners with 3D images, we can monitor where tumours are located, how they further develop and whether cancer cells have spread to other parts of the body. The research project EUREKA SCISILIA has resulted in a breakthrough in the sphere of nuclear imaging. Using new technology, developed at the TU Delft, scanners can spot a tumour sooner and better. The result: earlier diagnosis, better quality of life for patients and lower medical costs. The technology also makes it easier to assess whether or not the patient takes to chemotherapy. The University of Groningen, VU Medical Centre and Philips work together to improve life-saving PET-scanners. www.eurekanetwork.org/projects/success-stories
On a global scale, 1 out of every 3,500 boys are born with Duchenne Muscular Dystrophy (DMD). This rather rare hereditary muscle disorder involves the slow deterioration of muscle tissue. The first symptoms manifest themselves between the age of three and five, when the boys become tired easily and find it difficult to climb onto a chair. Most patients ultimately end up in a wheelchair and most die before reaching the age of thirty. With its innovating technology Exon skipping, the bio-pharmaceutical company Prosensa hopes to change this. With this new technology, Prosensa is working towards developing a cure for DMD.

www.prosensa.com

Living at home longer thanks to clever device

How can we make health care better, less expensive and, particularly, more efficient? Maastricht Instruments developed the ‘ECG Necklace’, a clever device that allows patients to measure their heart rate, (muscle) activity and temperature as a precautionary measure. How does it work? The patient wears the device around his or her neck the entire day and the results of the measurements are sent to the care providers via the ‘Body Area Network’ platform. They can analyse and monitor the data in a reliable manner. But the greatest advantage is that patients can continue to live at home without being hindered.

www.maastrichtinstruments.nl

Relieving anxiety with children’s drawings

A medical examination in the MRI-scanner is a tense experience for adults, let alone for children. Philips Healthcare developed an MRI-scan that is specially designed for children in order to make them feel more at ease during the examination. During the scan, the patients are surrounded by light projections of children’s drawings. Peaceful sounds enhance the experience. In many cases, children are less fearful of being place in the MRI-scanner in this way. Adults too experience less anxiety if they can control the images that are projected around them. Medical examinations that you do not undergo for the fun of it are found to be less stressful in this way. www.healthcare.philips.com

One’s own cartilage to the rescue

One knee operation instead of two or more, that is the advantage of new CellCoTec. Thanks to this technique, damaged cartilage in the knee joint can be repaired using the body’s own cells. The production of new cartilage is accelerated by combining cell types. A huge advantage for the patient, as he or she will need but one operation and will recover quicker and for a longer period. In addition, it is of course less costly. The technique offers a solution to the 1.2 million patients across the world who must deal with cartilage injuries every year.

www.cellcotec.com

Cure for DMD

www.prosensa.com
We are almost there. The World Health Organisation (WHO) expects to be able to establish the last case of polio in 2016. And by the year 2018, the disease should be permanently eradicated, partly thanks to a new generation of polio vaccines. Intravacc plays a crucial role in the Global Polio Eradication Initiative of the WHO. Dutch researchers render the large-scale production of the Inactivated Polio Vaccine (IPV) possible, all around the globe.
Intravacc (Institute for Translational Vaccinology) is concluding contracts with companies in China, India, Mexico and South-Korea, among others, for the purpose of technology transfer. Via a close cooperation, patented, top notch technology for the production of safe polio vaccines is licenced to as many producers as possible, in various regions around the world.

“Countries prefer to be self-sufficient when it concerns vaccines”, says Wilfried Bakker, programme manager polio vaccines at Intravacc in Bilthoven. “Moreover, that is in keeping with the strategy of the WHO, which supports this project. All of the producers plan to produce more than needed for their own market and will export the remainder, leading to a decrease in the purchase price of the polio vaccines.”

The WHO and the charity organisations that support the public-private Global Polio Eradication Initiative consider Intravacc a natural partner, says Bakker. “Our work aims to reduce the gap between the laboratory and the market. It is one of our strong points: translational research, in which we test a concept for a vaccine from a professor’s laboratory and develop a production process as soon as possible.” New medication reaches the world population quicker in this way.

**Transfer of knowledge**

How Dutch researchers acquired their prominent position in the sphere of vaccination? According to Bakker, that takes us back to the sixties of the twentieth century. Thanks to researchers, a production process for polio vaccines on an industrial scale could be developed in Bilthoven. From the very start, the Netherlands focussed on the inactivated polio vaccine (IPV), which became the most commonly used weapon against polio in the Western world half a century later. ‘Developed in Bilthoven’ became a household word. “On the principle of public health and foreign aid, everyone worked together with everyone”, Bakker tells us. “Researchers with people who worked at companies and institutes that would later be swallowed up by large pharmaceutical groups. They implemented the technology on a large scale. Our newly developed polio vaccine involves a similar transfer of knowledge.”

**New generation polio vaccine**

The oral polio vaccine (OPV) is a good and inexpensive vaccine. But it is precisely this widespread OPV that now stands in the way of permanently eradicating polio. This oral vaccine is so effective because it contains living weakened polio virus strains. In extremely exceptional cases, however, these can mutate back in the gastrointestinal tract of vaccinated children and cause new infections. “OPV works extremely well, let there be no mistake about it”, says Bakker. “It is not without reason that we have come so close to our goal of a world without polio. But by the time that the last case of polio is established, the WHO plans to stop its administration. But even after polio has been eradicated countries will continue to use a polio vaccine for years to come.” The WHO wants all of the countries to use IPV in order to maintain a polio-free world. Which is why efforts are being made to make a less expensive vaccine available, with sufficient production capacity. Researchers at Intravacc, a non-profit-organisation with 130 employees, stemming from the government agency Netherlands Vaccine Institute (NVI), made a start with preliminary studies as early as 2007 into the safe and affordable production of a new generation of polio vaccines. The newly developed injectable, inactivated polio vaccine, called Sabin-IPV, makes use of less virulent Sabin seed strains of the polio virus. This minimises the risks during the vaccine production process.

**From pilot to production**

For the Chinese market, for example, Intravacc works with Sinovac, one of the trendsetting vaccine manufacturers in the country. Representatives from Sinovac are soon to visit Bilthoven to learn the production process. That starts off with a realistic approach to the process on lab tables. That lab scale is imitated in the representatives’ own country, after which a process of data-exchange begins. The manufacturer can then upscale to a pilot production and production scale. This is followed by clinical lots and the start of a study into adults and babies, with the support of Intravacc if desired. Bakker: “Of course we also successfully studied the effectiveness of inactivated polio vaccine in new-borns, but local legislators prefer that the vaccine is tested locally as well.”

**At the centre of the triangle**

Intravacc will continue to fulfil an important role for the Dutch Ministry of Health, Welfare and Sports in 2015 as well. “Intravacc is at the centre of the triangle of researchers, government and the business community”, says Bakker. “The government authorities are depending on Intravacc within the scope of the tasks regarding Dutch public health. Whether it concerns polio, the H5N1 or perhaps Ebola in the future. The whole world is watching us.”
The medical costs in Western countries are increasing and this generated the need for cheaper solutions that can be supplied in a more made-to-measure manner. In the project CAJAL4EU, ENIAC JU worked for three years with 25 different partners from eight European countries on the development of new nano-electronics based on biosensor technology. The result is platforms that can be used to monitor data quickly and in a user-friendly and cost-effective manner. This also facilitates a further analysis of the data in applications. The technology can be used for specific applications with respect to the diagnosis of infectious diseases and cardiovascular diseases. The close cooperation with the end-users and the medical companies was crucial in obtaining this excellent result. [www.eniac.eu/web/downloads/projectprofiles/call2_eniac_cajal4eu.PDF](www.eniac.eu/web/downloads/projectprofiles/call2_eniac_cajal4eu.PDF)

Where can start-ups in medicine development dispose of a screening facility that can only be found in the laboratories of major pharmaceutical companies? Pivot Park in Oss is a unique campus for open innovation, where you find starting companies alongside long-established companies. The beating heart of which is made up of that screening facility, a robot installation that is capable of screening hundreds of thousands of substances in terms of their effective qualities. Facilities, knowledge and expertise are available to all of the companies in the rapidly expanding Pivot Park. The complex opened in 2012 with government support and the support of MSD and already consists of thirty companies. [www.pivotpark.nl](www.pivotpark.nl)

By bringing the head office of EATRIS to Amsterdam, the Netherlands has strengthened its role as a centre for cross-fertilization between the European academic community and the industrial sector. The Netherlands has eight UMCs and various top rate institutions that are at the forefront of translational research, resulting in a more rapid translation of fundamental biomedical research into products and services for the patient. EATRIS is a consortium of EU member states and the trend-setting centres for translational research in these countries. It coordinates and supports these centres in order to grant European researchers access to infrastructure and facilities. [www.eatris.eu](www.eatris.eu)
Taking control of one’s own care

Patients with recurring mood disorders often require intensive care. In the project ‘eCare@Home’, ZonMw – The Netherlands Organisation for Health Research and Development – examines how we can offer these patients this care, while ‘unburdening’ at the same time. The solution is an ICT-platform where patients, other parties involved and care providers are in contact with one another on-line and can monitor what kind of care is needed. The patients are given a homePad, a user-friendly tablet computer with applications that are oriented towards maintaining control, self-sufficiency and quality of life. This makes it easier to ask for the necessary care. And the care providers can easily offer care and give advice if necessary. In addition, problems come to light more quickly and the platform stimulates social contacts. www.zonmw.nl/en

Roll-up lens from Groningen

Groningen has no less than two trend-setting artificial lens factories with clients from all over the world: Ophtec and Abbott Medical Optics. They work to perfect the artificial lenses that are used to replace the natural eye lens during a cataract operation. The small cut in the eye that is necessary in order to insert the lens in its rolled-up form is a mere 2.4 millimetres. Once positioned, the lenses unfold and take on the right shape. In addition, the artificial lens is being adapted more and more to the wants and needs and the situation of the patient. The University Medical Centre Groningen, together with Abbott, is conducting research into lenses that are precisely tailored to the eye of the patient. www.amo-inc.com

Artificial kidney: self-dialysis

No longer being dependent of kidney dialysis or a donor kidney, that is what the Dutch Kidney Foundation wants for 2.5 million kidney patients. Together with renowned scientific institutes, academic hospitals and companies, the foundation is developing the revolutionary, portable artificial kidney. This compact device means a breakthrough to many kidney patients. Self-dialysis, wherever and whenever they want, instead of a trip to hospital three times a week. The portable artificial kidney is smaller and lighter, rinses longer, purifies the blood more gradually and offers more freedom of movement compared to existing equipment. But we have to be patient, the first pilot model of the portable artificial kidney is scheduled for 2017. www.nierstichting.nl/werk/onderzoek/draagbare-kunstnier
Almost half of the global population is at risk of contracting malaria. It causes between 500,000 and 1,000,000 deaths every year. Young children in Africa in particular are vulnerable, but malaria also occurs in Asia and South America. The Dutch biotech company Amplino has a new diagnostic device under development that enables local entrepreneurs to save hundreds of thousands of lives. What makes the product unique: it is portable, affordable and much more sensitive than other malaria tests used in the field.
Wouter Bruins, biotech entrepreneur at Amplino. Amplino brings proven biotech to the field. Their kitchen table prototype has evolved into a sturdy suit case medical device.

Three students with an idea, sitting at a kitchen table. Their hobby is transforming biotech ideas into prototypes. They work with Arduinos and 3D-printers. They grab a shoe box, a hair dryer and an electronics plate. The boys make a real-time Polymerase Chain Reaction (rtPCR) machine quick and dirty. Because it is fun. Wouter Bruins: “Most biotech companies do not start out at the kitchen table, but rather in a large lab and starting from a commercial idea. In our opinion, the kitchen table is the best place to prove that a technology is solid.”

Detecting parasites
The rtPCR-machine heats and cools in support of a biochemical reaction called a Polymerase Chain Reaction (PCR). A PCR can demonstrate the presence of certain DNA very specifically and sharply. “We are technology-driven. Once we had the technology, only then did we proceed to consider for which specific goal we wanted to use it. It became evident during talks with the University Medical Centre Leiden and the Royal Tropical Institute that the diagnostics of malaria was a good application for our invention”, Bruins tells us. “We can detect whether or not a certain parasite, such as plasmodium, is present in a blood sample. To that end, you add a number of chemicals to a small portion of blood. The mixture is first heated and then cooled. If the parasite is present, extra DNA will be constructed; if the parasite is lacking, then that will not happen.”

Pregnant women particularly vulnerable
Malaria is dangerous to pregnant women because their immune system is being repressed. But detecting this disease is especially difficult in pregnant women. And so if these women have a fever, doctors cannot determine straight away that they have malaria. The mothers and their unborn children are often administered medication as a precaution, even though it is not actually necessary. Bruins: “Preventing situations of this kind is crucial in the preventive resistance strategy of pharmaceutical companies and NGOs.”

Permanent eradication
“It is furthermore important, if you want to genuinely eradicate malaria in a certain area, to also diagnose the a-symptomatic cases. These concern people who are a carrier of malaria, but who are not ill. Our machine can do that, as it is so sensitive that even the tiniest trace of DNA can be detected. If you can treat this relatively small group as well, then they can no longer infect mosquitoes and will no longer reintroduce the disease into the community.” Amplino’s machine is equipped with cloud communication. This facilitates collecting big data from various regions.

Low tech
Amplino has been granted various incentive awards, such as the Vodafone Mobiles for Good, the Yes! Delft Launchlab prize and the PwC Social Impact prize. The company currently further developing its product and is looking for investing partners with which to form a consortium. What is challenging in this respect is that they go about things quite different from most other life sciences companies. “We always ask ourselves ‘how low can you go?’, whereas things can’t be high-tech enough for most other life sciences companies. We are of the opinion that our product is most likely to have an effect if we keep it affordable. After all, the poorest people in the world live in the areas where malaria most often occurs.”

Effective investments
Bruins puts a lot of effort into his starting company. “I am not an idealist pur sang. I am a biologist and a biology freak. But before I started this, I did think ‘Fine, if I am going to work on this eighty hours per week, then I want to do something that will really make a difference to other people’.”
Dutch health architecture in Dubai

The Dubai Diagnostic Center was designed by Dutch Health Architects and Philips Design Healthcare as a concept to improve medical diagnostics in Dubai. Cultural and local aspects played an important role in the way the building was designed. The calming atmosphere created by the interior design is reducing stress and anxiety. Reinvented principles of natural ventilation are used to create a good indoor climate. Using Plug and Play high tech, the latest state of the art equipment can be installed without disturbance of the diagnostic activities. This concept shows how an integral design approach combining architecture, hospital planning and interior design, can create a patient friendly and sustainable building. www.egm.nl
Organ on a chip

In cooperation with the Harvard University, among others, the Dutch biotech company Mimetas is currently working on the commercial development of organs on chips. Further research into this product is possible thanks to the financial agreement with the American company BioHealth Innovation. Organs on chips are an effective and lucrative way of conducting tests for scientific research and the pharmaceutical industry. Human tissue and organs make for more realistic and more accurate laboratory models compared to, for example, research on animals or using the classic method of tissue cultures in a Petri-dish. New drugs can be introduced on the market quicker and cheaper in this way. [www.mimetas.com](http://www.mimetas.com)

Truck becomes modern health clinic

Why build new hospitals at various locations when we can bring them along from the Netherlands? Lamboo Mobile Medical develops special mobile clinics that offer the same quality of care as do hospitals. This makes adequate medical care accessible to everyone around the world. The trucks can readily access all of the locations. For example, a mobile hospital was set up in Krasnodar, Russia, under extremely cold circumstances, with temperatures dropping to -51 degrees Celsius. And a fifteen-metre long health clinic, where patients can undergo three different preventive cancer treatments, was set up in Brazil. Lamboo is active in more than thirty countries on six continents in this way. [www.mobile-medical.eu](http://www.mobile-medical.eu)
Jos: “No, Gen-Alice. Think Alice in Wonderland. Because we do things differently in our company and we are curious. I think we have that in common with Knome. Our companies share the can-do mentality. And we are small and flexible enough to enter into this collaboration.”

Josh: “We had to vet each other as a potential partner, as well as the technical feasibility and overall compatibility between our two platforms. Plus we had to do this with a company we had only heard of and read about and who is in a sense a competitor of ours. That is unheard of. A little pressure can be a good thing.”

Josh: “Given the circumstances and tight timeline we were under, we decided to start off with the most economical solution. This involved delivering and integrating two separate appliances and then connecting them via an Infiniband cable, which is a very fast network protocol. But that would be oversimplifying things in terms of how the overall solution was architected, including what had to actually be delivered and installed, and then to ensure the two technologies interact properly.”

Jos: “The next time we’re really going to tighter integration of that connection, also with a view to the future to offer this infrastructure to new customers. For us, that desire has only grown since we met in October for the first time in person, at the conference of the American Society of Human Genetics.”

Pardon?

Josh: “So far we have done everything through teleconferencing. That takes trust. We are working on somewhat similar products and focus on the same small, but growing group of clients. In this field you see companies come and go; their systems are often not ready for broad adoption. And Genalice has only been around for about three years. But we were impressed immediately what GENALICE MAP can do in NGS data processing capacities.”

Why is GENALICE MAP faster and better than the rest?
Jos: “We have an incredible technological development in this area. The sequence reads from a human gene pool or genome, which comprises 3.2 billion base pairs of DNA, took months for sequencing machines five years ago. The latest machines can do this in a few
hours for 1,000 euros. The bottleneck was shifted to the processing of all the data produced. This takes conventional software solutions days. How do we do it faster and better than our competitors? Their solution is often brute force: just add more hardware. They work with algorithms from 1983 that are tweaked and tuned to make them faster or better. We have our product based on completely new algorithms, which greatly improves the proven speed and accuracy."

How does that work?
Jos: “You better ask Hans Karten, our wiz-kid CEO/CTO. He worked for years in the generic high speed, high volume data processing at Oracle. You could see it this way: the pieces, for example, cancer patients are completely upside down. We put them in order and find the differences. Next you need to interpret the anomalies found and report to the physician or researcher. At that point knoSYS takes over. We really are a software development company. We focus on optimizing data processing of large DNA files.”

What then does the knoSYS platform do with that information?
Jos: “What follows is the most expensive and time-intensive step in the process. The committee of medical directors, specialists can take weeks to interpret data from an individual sample or patient. Our job is to streamline this process, providing access to the most accurate and actionable data available to this multidisciplinary team through our end-to-end, interpretation infrastructure that we built for the Swiss Foundation, in which we connect to GENALICE MAP. I think as an industry we’re making greater progress than ever before.”

Exciting times.
Jos: “Certainly. We are at the beginning of an era in which specialists are able to observe underlying DNA abnormalities when developing new drugs. It leads to better diagnosis and better targeted, medicine. Precision medicine is the future and the sweet spot of medicine.”
Jos: “There are so many other ways that genetics can be used to improve individual health and even healthcare at a macro-level. One of these ways is in earlier and more accurate diagnosis. Another way is in preventative health. The earlier we can understand predispositions and make positive changes, the healthier we can be.”

The Swiss Foundation for People with Rare Diseases made the connection. GENALICE MAP is an ultra-fast and highly accurate NGS data preprocessing solution, knoSYS is the most accurate and user-friendly genomics interpretation system. Coupled, they provide the best, fastest and most cost-effective package for the processing and interpreting of human DNA. “Not only our products, but also our teams and the synergy generated by the collaboration are a perfect match”, said Jos Lunenberg of GENALICE.
Doing business with the Dutch
The portal to doing business with the Netherlands. Here you can find information about Holland, markets, rules and regulations. The information centre will help to link you up with interesting Dutch partners.
www.hollandtrade.com/business-information

Dutch diplomatic missions and Business Support Offices
Provide you with useful business leads and contacts through their international network. Staff will assist you with your trade requests and introduce you to the various trade programs.
www.minbuza.nl/en/services/tradeinformation/trade-information.html

Network of Innovation Attachés
Innovation Attachés act as liaison officers during international collaborations with Dutch top sectors. They are posted at embassies and consulates.
http://english.rvo.nl

Netherlands Foreign Investment Agency
The NFIA is the first port of call for foreign companies that want to set up business in the Netherlands and take advantage of the Dutch business environment as a strategic base for doing business in Europe. www.nfia.nl

Netherlands Enterprise Agency (RVO.nl)
The Netherlands Enterprise Agency encourages entrepreneurs in sustainable, agrarian, innovative and international business.
http://english.rvo.nl/

Dutch Top Sectors
These are the sectors in which the Netherlands excels globally and which receive high government priority. They are: Life Sciences & Health, High Tech, Chemicals, Logistics, Agri-food sector, Horticulture and starting materials, Water, Energy and Creative Industry.
http://topsectoren.nl/life-sciences-health

Top Sector Life Sciences & Health
The Netherlands is home to a vibrant, dense Life Sciences Health cluster of more than 3,000 life sciences and medtech companies and research organizations, all within a 120-mile radius. Life Sciences Health is one of the leading sectors in Dutch economy.
www.lifescienceshealth.com

LSH Plaza
LSH Plaza facilitates future PPPs in the Dutch Life Sciences & Health (LSH) sector. LSH Plaza is also pivotal in the execution of the TKI regulations (http://www.rvo.nl/TKI) for the LSH field. LSH Plaza builds upon, and works with, the various PPPs in the Netherlands that are active in the sphere of life sciences technology, imaging, molecular diagnostics, pharmacotherapy, regenerative medicine and healthcare solutions.
www.lifescienceshealth.com