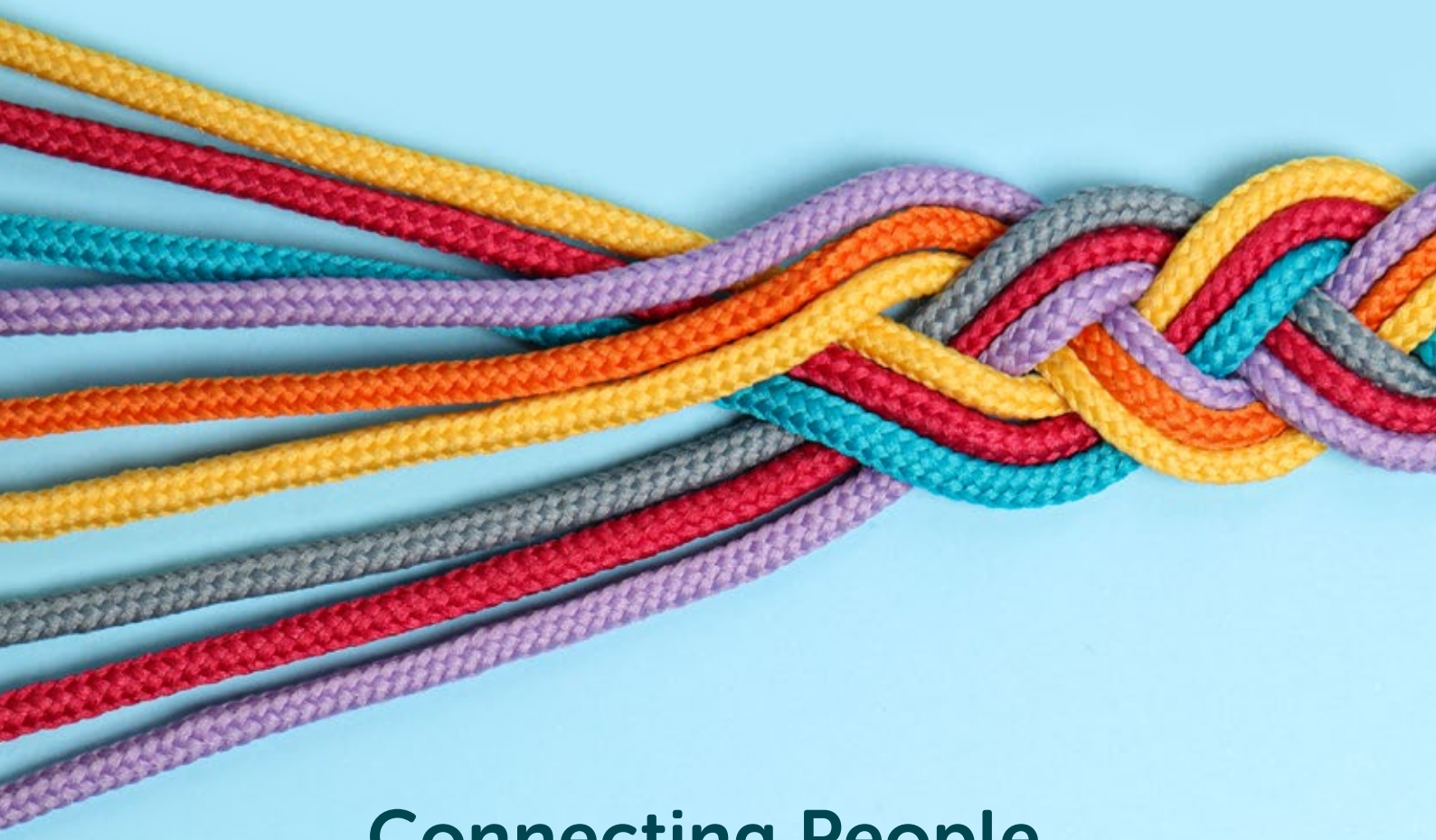
Amsterdam UMC
University Medical Centers

Cancer Center Amsterdam



Connecting People, Achieving More Together

Annual Review 2020

Progress accessible for all

Groundbreaking professionals

Moving forward together

Together we can achieve more
and make progress possible.

Contents

Lenka Boyd

photo by Unmask Photography (Bambos Demetriou)

The year 2020 will go into history as the year of COVID-19. The pandemic came with significant hardships that impacted us all, but also inspired perseverance and creative thinking, amongst researchers, educators, fundraisers, and medical professionals. Above all, it called on our capacity to adapt and we are proud to see that our Cancer Center Amsterdam has shown tremendous flexibility to ascertain that progress was not stalled but continued as before, also in the oncological domain.

In 2020, we have seen an enormous surge towards centralized oncological expertise at Cancer Center Amsterdam. The need to adapt to COVID-19 inspired a new reality for the teams involved. Already we see the impact of joining oncological forces between our two locations with significantly improved care and collaborations. Progress was also evident in areas like precision treatments that reduce collateral damage for patients, Artificial Intelligence to adapt treatments and empower new discoveries, and innovative personalized therapies, like CAR T-cells, that potentially save lives. This progress would not have been possible without all the people who make Cancer Center Amsterdam a unique place to be. New professors, PhD promotions, ambitious and adaptive employees, groundbreaking publications, numerous grants, and distinguished prizes received by our professionals underline our mission to create new possibilities for patients with cancer. It makes us proud that those groundbreaking experts are part of our team and that they have managed to overcome the challenges of 2020.

The theme of this magazine is **'connecting people, achieving more together.'** Every professional holds a different piece of the puzzle, and so do our patients. By joining forces, we connect the pieces in pursuit of a complete picture that spurs progress. We would like to dedicate this publication to all employees, colleagues, and volunteers at Cancer Center Amsterdam, but above all to our patients. Together we can achieve more and make progress possible.

Prof. Jan Paul Medema
Director of Research Institute
Cancer Center Amsterdam

Prof. Geert Kazemier
Chairman of the Executive Board
Cancer Center Amsterdam

Connecting People, Achieving More Together

JOINING FORCES TO ADVANCE CANCER RESEARCH AND CARE

Amsterdam UMC Cancer Center Amsterdam is a leading academic oncology center that combines high-quality patient care with innovative research and education of future professionals. We connect patients, medical staff, scientific experts, and talented students together in our mission to create groundbreaking new possibilities for patients with cancer. Together, our healthcare experts form multidisciplinary teams for every patient to provide the best available care and outcome. Together, we educate the scientists and care givers of the future. Together, we learn from and are inspired by every patient. We strive to achieve faster diagnosis, accessibility, and affordability for all cancer patients by expanding our regional networks. We connect to professionals all over the world in our collaborations. We connect science and care for mutual inspiration. **Together, we achieve more.**

PATIENTS INSPIRE PROGRESS

Patients with cancer are at the center of all our work. They inspire us to do the innovative research which drives progress in present and future cancer care. Our patients not only have access to the latest expertise and state-of-the-art care facilities, but they also can contribute to a better future by being actively involved in scientific research and the education of tomorrow's health care providers.

Collaboration is the key to achieving progress in understanding and treating cancer.

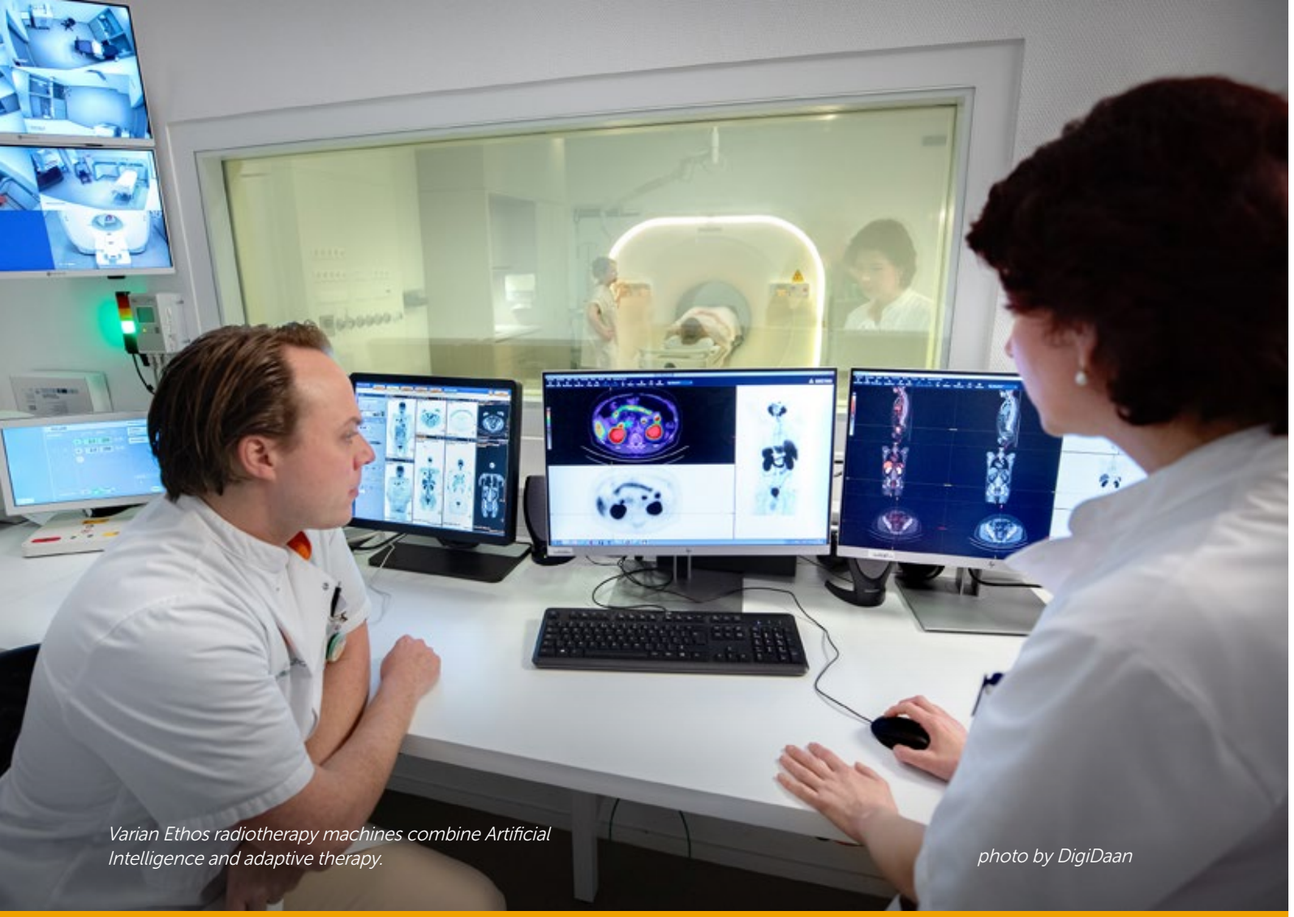
SCIENCE AND CARE CONNECTED

We bring together medical specialists from different disciplines in combination with advanced technology and scientific research. Our clinics have extensive knowledge and experience in the treatment of different types of cancers. A multidisciplinary team will look at each patient from different angles in order to determine the best course of action. Scientific research is also being conducted in the centers of expertise to ensure optimal treatment according to the latest medical insights, and to generate new insights to develop new and better therapies. The best patient care and top scientific research go hand in hand.

ADVANCING RESEARCH BY PROVIDING EXPERTISE

In 2020, the Cancer Center Amsterdam Foundation provided funding to stimulate advancement in these highly promising areas.

- Our Liquid Biopsy Center coordinates a centralized collection of biofluids from cancer patients for research enabling the development of non-invasive tests, ranging from earlier cancer diagnosis to better treatment selection and monitoring.
- Our CRISPR Expertise Center helps researchers stay up-to-date and utilize the full potential of the groundbreaking CRISPR technology in cancer research.
- The new Amsterdam UMC ImmunoTherapy Center will facilitate the discovery of new cancer therapies empowering our immune system.



Varian Ethos radiotherapy machines combine Artificial Intelligence and adaptive therapy.

photo by DigiDaan

PROGRESS ACCESSIBLE FOR ALL

Making progress together

We integrate groundbreaking science with high quality care and inspirational educational programs to fuel progress that is accessible to everyone. By harnessing the power of big data, our professionals begin to see patterns that point the way to new insights, treatments and predictions. We are deploying the latest medical technologies to increase treatment precision. Our personalized care includes both tailoring individual treatments and listening to our patients' needs. Expanding care networks strive to achieve faster referral and diagnosis, and increase accessibility for all patients with cancer.

We highlight our progress in the following areas:

PRECISE TREATMENT

Advancing technologies enables more effective cancer treatments with fewer side effects.

Because cancer is a complex disease, standard treatments do not always provide the desired outcome. Cancer therapies are ever evolving towards more precision in treatments. We are deploying the latest technology in:

- Surgery assisted by smart robotics
- Radiotherapy machines incorporating Artificial Intelligence for adaptive treatment

See the section, 'More precise treatment, less collateral damage'

PERSONALIZED MEDICINE

Highly personalized cancer treatments help improve outcomes for individual patients.

Just like every patient is unique, every patient's cancer is different. Understanding these differences can hold the key to treating and curing cancer. We are:

- Looking at molecular changes in a tumor to guide treatment choices
- Stimulating the body's own immune system to destroy cancer cells
- Listening to the patient to find the right treatment plan

See the section, 'Personalized Medicine'

ARTIFICIAL INTELLIGENCE & MACHINE LEARNING

Diagnostics and predictions from Big Data.

The use of Artificial Intelligence (AI) is being rapidly deployed in cancer research and treatment. The potential of AI to fuel progress is undeniable. We are using and developing AI to:

- Find the best radiation treatment plans
- Predict outcome of treatments
- See how treatments are progressing
- Guide our treatment machines for more precise therapy
- Gain insights from large amounts of research data

See the section, 'Artificial Intelligence & Machine Learning'

NETWORKING AND COLLABORATIONS

Putting together the pieces of the puzzle.

The rapid expansion of video conferencing means collaboration and coordination is easier than ever. We are expanding our networking and collaborations to:

- Assure access and quality of care for all patients with cancer in the Netherlands
- Confer with a team of specialists for the best treatment plans
- Use networks to connect patients to the expertise they need
- Connect and collaborate to advance and implement the latest research insights

See the section, 'Working together for success'

More precise treatment, less collateral damage

More precise treatments mean more effective cancer treatments with fewer side effects. By employing the latest technologies, we are reimagining cancer care for individual patients in pursuit of the best possible outcome. Robotics are being used to enhance surgical precision, and Artificial Intelligence-guided radiation therapy is greatly improving the precision of treatments.

IMPROVED PRECISION USING ROBOTICS FOR CANCER SURGERY

To improve the quality of care and to offer less invasive treatments to patients, surgeries with the support of a robot have become more commonplace within the operating room. Specialists at Amsterdam UMC welcomed the purchase of a second 'da Vinci Xi' advanced robotic system in 2020 thanks to funding from the Cancer Center Amsterdam Foundation.

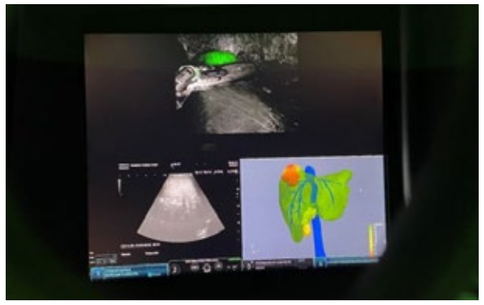
ROBOTIC ARMS MAKE LIFE BETTER

What makes robot-assisted surgery better in comparison to currently existing surgical procedures? A major advancement is that robot-assisted surgery offers a greatly improved system to perform minimally invasive or 'keyhole' surgery resulting in less trauma to the patient's abdominal wall, reduced blood loss, less pain, and faster recovery. The mechanical arms with rotating instruments offer the surgeon three extremely dexterous 'hands', so to speak. The improved ease of use, flexibility for different surgeries, and better accessibility of almost all anatomical spaces in the human body.

In addition, the platform allows for fully image-guided surgery for more precise removal of tumors. The robotic console also offers a comfortable seating position that relieves neck and muscle complaints surgeons often experience during laparoscopic surgeries.

INCREASED PRECISION DURING LIVER SURGERY

The benefits of robot-assisted surgery are being utilized for operations on the liver, among other surgical interventions. Every year, 175 liver operations are performed at Amsterdam UMC, with about half of these currently performed with a robot, giving excellent outcomes: whereas liver patients used to be hospitalized for 5 to 7 days, now the average recovery time is only 3 days following robot-assisted surgery.



The Robotic Surgery Cockpit. The vision of the surgeon looking into the robotic console. Different imaging techniques, such as fluorescence (upper panel), ultrasound (left lower) and 3D CT scans (right lower), can be uploaded and employed according to the surgeon's needs.

> We can perform cancer operations at high numbers with great precision, guided by the latest imaging techniques.
>
> Dr. Rutger-Jan Swijnenburg, Hepatobiliary and Pancreatic Surgeon.

FINE-TUNING TREATMENT TO TARGET TUMORS

The latest radiation technology empowers us to see more, know more and treat more precisely.

The department of Radiation Oncology at Amsterdam UMC has installed six new state-of-the-art ring-based Varian Ethos linear accelerators at locations in Amsterdam and at Flevoziekenhuis in Almere.

These accelerators utilize the latest software incorporating Artificial Intelligence, making it possible to adapt the treatment plan to the daily anatomy of the patient instead of applying the same plan every time. This technique is called online adaptive radiotherapy and it allows for a much more precise delivery of treatment which results in less radiation exposure of the healthy surrounding tissue.

"Adaptive therapy is one of the most important developments in the field of radiotherapy, and the new Ethos solution will greatly increase our ability to offer this advanced treatment to patients," says Prof. Ben Slotman, head of the department of Radiation Oncology.

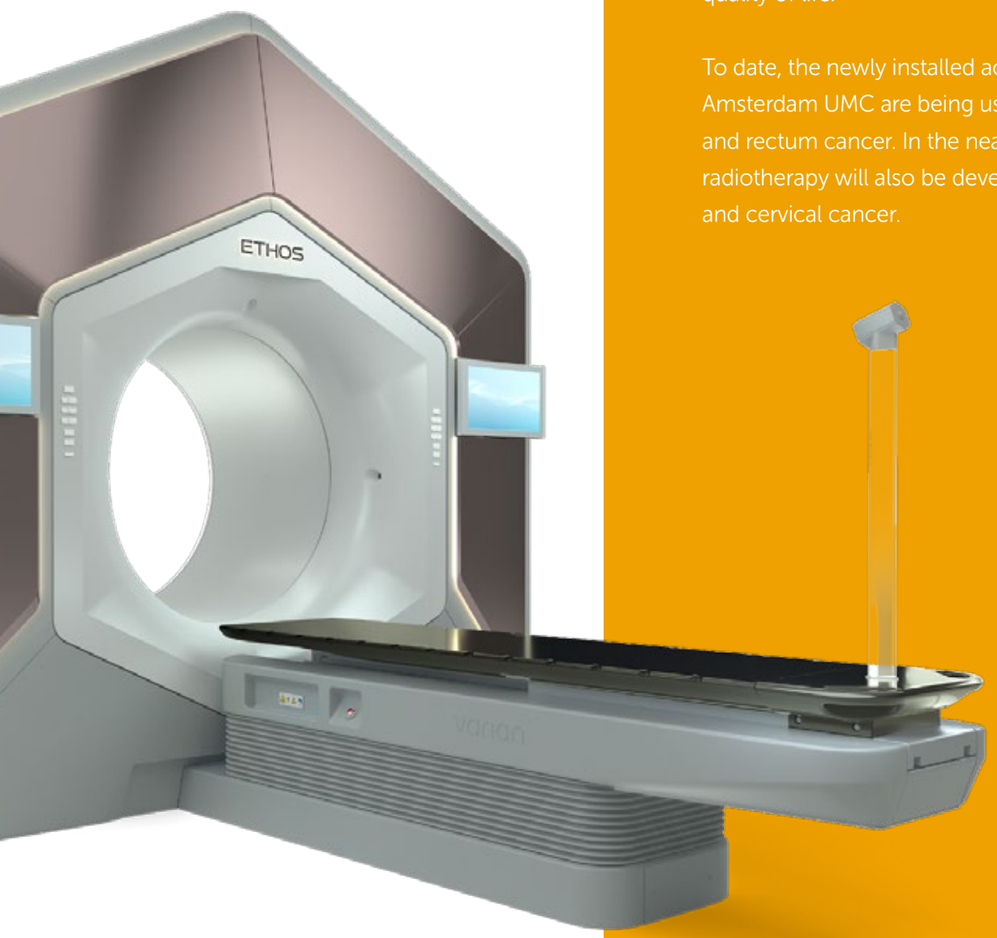
External beam radiotherapy is a non-invasive treatment modality that aims at eradicating cancer using ionizing radiation and is delivered using a linear accelerator. It can be a stand-alone therapy or part of an adjuvant treatment combined with surgery and/or chemotherapy

The radiotherapy treatment typically starts with a single reference CT scan to define the tumor volume and to create a treatment plan. To take advantage of better recovery mechanisms in healthy tissue compared to cancer cells, this treatment plan is delivered over several days.

SHRINKING THE SAFETY MARGINS AROUND THE TUMOR

Daily posture changes of the patient and internal anatomy changes need to be accommodated by applying a safety margin around the tumor. In the pelvic region, safety margins are typically large because the volume of the bladder and rectum can vary substantially on different days. This large margin inevitably leads to radiation exposure of surrounding healthy tissue, which can cause acute and/or long-term side effects. However, online adaptive radiotherapy can shrink the safety margins around the tumor from 15-20 mm to 5-8 mm. This limits the exposure of healthy tissue and reduces side effects, thus improving patients' quality of life.

To date, the newly installed accelerators at Amsterdam UMC are being used to treat bladder and rectum cancer. In the near future, adaptive radiotherapy will also be developed for prostate and cervical cancer.



The groundbreaking Varian Ethos linear accelerators use Artificial Intelligence to deliver more precise radiation treatments.

photo by Claudia Kamergorodski

Personalized Medicine

The more we know about a patient, the better care we can provide. Highly personalized cancer treatments boost our capabilities to prevent, diagnose, treat, and predict disease outcome for individual patients.

Testing a patient's DNA for precise hereditary alterations that drive their cancer can guide personalized treatment choices and may even predict disease outcomes. Using the body's own immune system to destroy cancer cells is proving to be a highly effective personalized treatment for some patients. Patient's perspectives are central in our dedication to a personalized approach, to find the right treatment plan at the right time for each individual.

SELECTING TREATMENTS BASED ON GENETICS

Technologies such as high-throughput DNA sequencing are providing more and more precise insights into the processes that drive cancer. Tumor profiling can identify changes in the tumor's DNA that cause cancer to grow and spread. With our increasing understanding of the aberrant processes in tumors, we are continuously striving to develop precision medicines that specifically target these abnormalities to destroy cancerous cells.

In collaboration with the Hartwig Medical Foundation, Amsterdam UMC is working to obtain and analyze large-scale DNA information from individual cancer patients to find cancer weaknesses that can be exploited by precision drugs, and to perform research in pursuit of new treatment opportunities.

INCREASING THE AVAILABILITY OF TARGETED TREATMENTS

The genetic changes that cause cancer are incredibly diverse. For example, two patients diagnosed with the same cancer type may have changes in different genes, while patients with different types of cancer may have the same cancer-causing DNA changes. At Amsterdam UMC, Hanneke van der Wijngaart, Mariette Labots and Prof. Henk Verheul (Radboud UMC) are involved in a nationwide private-public collaboration to collect and share information about using anticancer drugs 'off-label' for patients with advanced cancer. The genetic profile of the patient's tumor is examined to see if the changes driving the cancer can be matched with an existing precision drug, even though its use has not been approved for that type of cancer. Interim results reported at the European Society of Medical Oncology Virtual Congress 2020 showed that the targeted therapy is benefiting between 27-36% of patients with advanced cancer enrolled in the trial. Importantly, the adaptive character of the clinical trial means prompt implementation of new scientific insights: as more information becomes available during the project, the treatments are adapted or become available to more patients.

A BIG STEP FORWARD FOR CANCER IMMUNOTHERAPY

Immunotherapy is a type of cancer treatment that stimulates a person's own immune system to fight cancer. The ability of the immune system to recognize cancer cells as 'foreign invaders' is tricky, as tumor cells arise from normal cells within our own bodies and are sometimes not identified as being different. In addition, as a tumor grows it often evolves and finds ways to hide from the immune system.

With chimeric antigen receptor (CAR) T-cell therapy, a patient's own immune cells are modified in a laboratory – where they are given the ability to 'see' the malignant cells – and returned to the patient to eliminate their cancer. According to this principle, CAR T-cell therapy has proven to be effective for several cancers originating from the blood, bone marrow, or lymph nodes.

FOR SOME PATIENTS, CAR T-CELL THERAPY CAN SAVE THEIR LIVES

Amsterdam UMC was the first hospital in the Netherlands that was qualified for treating cancer using modified immune cells. CAR T-cell therapy is currently used to treat a limited number of blood-related cancers, and patients only qualify if they are sufficiently fit to withstand the serious side effects common with this treatment. This immunotherapy is achieving long-term survival for approximately 40% of patients who had run out of other treatment options. Amsterdam UMC has now treated around 50 patients with lymph node cancer, and more than half are still in remission after more than two years. This is a remarkable medical achievement, considering their limited life expectancy of a median of 6 months before the availability of CAR T-cell therapy.

Chimeric antigen receptor (CAR) T-cell therapy involves programming a patient's own immune cells to recognize and attack cancer cells as foreign invaders.

PROVIDING CLEAR INFORMATION AND IMPROVING THE QUALITY OF LIFE

Marie José Kersten, Professor of Hematology, has lobbied at the national level for the introduction and implementation of CAR T-cell therapy in the Netherlands, including getting this treatment reimbursed. She also coordinates Amsterdam UMC's involvement in several large national and international research consortiums. In 2020, Prof. Kersten obtained multiple research grants to implement CAR T-cell therapy faster for more patients and investigate the impact of this immunotherapy on patients' well-being and quality of life. Prof. Kersten explains: "CAR T-cell therapy does not work for everyone: only forty percent of treated patients have long-lasting benefits. We want to develop materials that support the patient during the entire process. It is precisely the voice of the patient and informal caregiver we listen to: what is needed to better guide them during that 'voyage'?" The goal is to determine the best way to educate patients, their support team, and treating physicians so that everyone knows what they can expect before, during, and after the treatment.

Professor of Hematology Marie José Kersten

photo by Marieke de Lorijn

CAN IN-HOUSE CAR T-CELL THERAPY SAVE TIME AND MONEY?

A consortium of academic hospitals in the Netherlands, headed by Tom van Meerten from UMC Groningen, and including Amsterdam UMC, Radboud UMC, and Erasmus MC, received a € 30 million subsidy from Zorginstituut Netherlands and ZonMw in 2020. The academic centers plan to compare in-house CAR T-cell production with commercial sources to see if savings in time and costs can be achieved. Marie José Kersten is also involved in this project. "A quicker throughput time is very important to these patients. It's precisely this group who needs the treatment fast because they don't usually have other options and have rapidly progressive disease, which is sometimes prohibitive for CAR T-cell therapy due to the waiting time during manufacturing," says Prof. Kersten.

Faster and cheaper CAR T-cell production would also significantly improve accessibility for more patients. Currently, treatment per patient costs around € 350,000 for the cells and the consortium aims to reduce that to € 80-100,000. CAR T-cell therapy is so expensive because the entire treatment must be developed from start to finish for each patient individually. It also takes about four to six weeks before the lab-engineered immune cells can be given to the patient using an international commercial partner. Some patients simply do not have that time. The consortium aims to reduce production time to two weeks, as well as possibly improving the quality of the CAR T-cells by avoiding the freeze-thaw processes necessary for shipping.

> CAR T-cell therapy will become cheaper over time, like everything in medicine. What we strive for is a ready-made off-the-shelf CAR-T medicine directly available for patients.
>
> Prof. Tuna Mutis, Professor Immunotherapy of Hematological Malignancies.

INCREASING THERAPY ACCESSIBILITY THROUGH RESEARCH

CAR T-cell therapy is also being explored for other cancer types. Amsterdam UMC Professors of Hematology Tuna Mutis, Sonja Zweegman, and Niels van de Donk, along with Dr. Maria Themeli, are investigating the use of CAR T-cells for the treatment of multiple myeloma, in which cancerous plasma cells hinder the creation of healthy blood cells in the bone marrow and induce bone destruction. "We started treatment of multiple myeloma patients without other available treatment options with CAR T-cell therapy with exceptionally good results. These patients are seeing a substantial gain in survival benefit," says Prof. van de Donk.
In addition to applying the immunotherapy to this disease, Prof. Mutis and Dr. Themeli are working on standardizing the process of CAR T-cell creation so that it becomes available for a broader group of patients.

'OFF-THE-SHELF' CAR T-CELL THERAPY

Dr. Maria Themeli and colleagues at the department of Hematology recently won an award for their abstract 'Generation of Universal "Off-the-Shelf" CAR-T from Induced Pluripotent Stem Cells' at the European CAR T-cell meeting. Rather than producing CAR T-cells from a patient's own cells, which are sometimes compromised by the cancer, her team is investigating creating CAR T-cells from a type of stem cell. "The existence of a readily-available CAR-T product would greatly benefit the broader use and success of CAR T-cell therapy," says Dr. Themeli. "There are still hurdles to be overcome, but I am convinced that in the near future, CAR T-cells derived from universal stem cells will have a place in the treatment of hematologic and other malignancies."

CAR T-CELL THERAPY: HOW DOES IT WORK?

CAR T-immunotherapy is a type of cancer treatment in which the patient's own immune system is weaponized so it can eliminate cancer cells.

T-cells are white blood cells, a type of immune cell that travels in the bloodstream and lymphatic circulation. When T-cells come into contact with a foreign substance or invading entities, they become activated and use receptors, a kind of antenna, to detect and attach to intruders. Once attached, the T-cells can make holes in a foreign cell and inject toxic proteins that cause the cell to die.

When normal cells transform into tumor cells, abnormal cellular processes may trigger T-cell activation by recognition of irregular molecules on the tumor's surface. However, as cancer evolves within a patient, the T-cells may not sufficiently recognize the malignant cells as being 'foreign'. CAR T-cell therapy has been developed to 'arm' the T-cells with antennas (CAR), educating them so they can see and kill the cancer cells. The CAR T-cell construct also contains a costimulatory molecule which allows for activation of the cells.

CAR T-cell treatment starts with filtering T-cells from the patient's blood. In a laboratory, the T-cells are then genetically modified using a harmless virus that introduces a new DNA code with instructions to make a CAR (chimeric antigen receptor). The CAR locates to the surface of the T-cell (now a CAR T-cell) and recognizes the structure of specific cancer cells. When returned to a patient through an infusion into the bloodstream, these CAR T-cells bind to the malignant cells and kill them.

One CAR T-cell can kill multiple cancer cells. The CAR T-cells can also expand in the patient, maintaining their CAR-T superpower to recognize and destroy cancer cells. The CAR T-cells stay in the body for a long time after the infusion, helping to keep the patient in remission by fighting cancer if it returns. For this reason, CAR T-cell therapy is usually administered only once. CAR T-cells can therefore be considered a 'living drug'.

INITIALIZATION OF THE AMSTERDAM UMC IMMUNOTHERAPY CENTER

Despite astounding success against some tumor types, immunotherapy does not yet work for everyone or every type of cancer. New discoveries are needed to better understand how tumors suppress the immune system, and to identify predictive biomarkers and explore new combination therapies. Towards achieving this, Cancer Center Amsterdam Foundation has financially committed to the establishment of Amsterdam UMC ImmunoTherapy Center. With this investment, Cancer Center Amsterdam aims to become an internationally leading immunotherapy center committed to providing the best possible care for cancer patients.

Parts of this article were adapted from the JANUS article 'Je eigen afweercellen als medicijn' by Mieke Zijlmans.

THE PATIENT AS A MEMBER OF THE CARE TEAM

Patients can help shape the care they receive based on their needs and perspectives. Our doctors present possibilities for treatment and decide together with the patient on the preferred option. We listen to our patient's feedback not only to determine whether the treatment is right for the patients' circumstances, but also to help identify and share best practices, and to learn and innovate.

Taking a patient's wishes into consideration when determining the right treatment plan is important for improving care outcomes. "Every doctor is convinced that they provide the best care," says Dr. Jan-Jaap Hendrickx. "But with information from the patient, you gain insight into the quality of life and the needs and wishes of the patient. Processing that information takes a little extra effort, but you find out what is really important for the patient at that moment. Research has even shown that just requesting this feedback can result in improved outcome."

This approach is part of the 'value-based healthcare' concept adopted by Amsterdam UMC in 2017. The fundamental goal is to increase the value of healthcare for the patient, rather than assigning value to the amount of healthcare services delivered. This is done by focusing on improving our patients' health, reducing the effects and incidence of cancer, and increasing the quality of life in an evidence-based way.

VALUE-BASED CARE: FEEDBACK FROM BRAIN TUMOR PATIENTS

Care for brain tumor patients (glioma care) involves a multidisciplinary team. As a result, many people are involved in the care path that the patient follows in the hospital. This can be very complex for patients who have just been diagnosed with a brain tumor. Through the input of patients, the program 'value-based healthcare' has provided several practical insights into the care path which resulted in some immediate improvements. One example is that conversations with patients and family at the hospital now take place in a different more hospitable room. In addition, more attention is given to discussing topics such as 'advance care planning' in a more accessible manner. Another benefit is that the program has contributed to an even closer collaboration between the various healthcare providers as part of the team, giving a clear focus and common goal both in patient care and research. This ensures growth and development of the care team and the care path for patients. Other examples of the value-based healthcare program include simpler data recording for multiple-use quality registrations (see 'Optimizing and sharing healthcare information'), and the development of an online referral system for faster feedback to the referring physicians and through them to the patients (see 'Timely treatment for patients with brain tumors').

Text adapted from 'Zorg voor hersentumorpatiënten: een voorbeeld', by Joke van Diemen-Markx

photo by Claudia Kamergorodski

Networking and collaborations: Working together for success

Sometimes experts at different locations have pieces of the puzzle for a successful treatment or research development. Due to better technology that is helping us stay connected, spurred in part by the pandemic, it is easier than ever to connect and collaborate.

Accessibility to the right experts and state-of-the-art facilities should be assured for all patients with cancer. We are actively initiating regional collaborations via online panels involving medical specialists at different hospitals. We are fostering collaborations and exchanges of information at all levels, from within research groups or surgery teams to across the world. We are continually expanding our networks and collaborations to fuel progress in cancer research and ensure that each patient receives the best care possible.

EXPANDING ONLINE ONCOLOGY NETWORKING

Since 2014, the health initiative Citrienfonds has been aiming to improve the quality of care while ensuring the accessibility and affordability of healthcare in the future, thereby promoting sustainable healthcare.

Prof. Marc Besselink is on the steering committee for the initiative 'Regional oncology networks', a Citrienfonds program created by the Dutch Federation of University Medical Centers (NFU) and made possible by ZonMw. This nationwide initiative aims to establish regional collaborative networks for specific cancer types in order to give patients access to the best available care.

One of the ways we support this program is by improving telemedicine solutions such as online expert panels. Dr. Tessa Hellingman, surgeon Babs Zonderhuis, Prof. Martijn Meijerink, and Prof. Geert Kazemier developed a digital communication platform to share medical data, including high-quality diagnostic imaging of patients suffering from colorectal cancer liver metastases. They concluded: "Implementation of an online expert panel is an innovative, accessible, and user-friendly way to provide cancer-specific expertise to regional hospitals. E-consultation of such panels may result in more efficient multidisciplinary team meetings and prevent fragile patients from needless referral."

The mission is to provide the best care for every cancer patient by stimulating cooperation and networking.

PARTNERSHIPS TO BUILD A BETTER FUTURE FOR CANCER PATIENTS

Turning a scientific breakthrough into a clinical application is never the result of a single person's effort: start-up of new companies or involvement of partners in industry is often an essential step. The IXA Alliance Office Cancer Center Amsterdam works to expand and intensify collaborations between industry and academic research groups.

To improve the lives of future patients or even cure cancer, we are in constant search of external partners who share similar objectives. A partner that can provide the right skills or facilities, technologies, compounds, tools, or funding for a research project is a crucial step in turning our research into progress.

OPTIMIZING AND SHARING HEALTHCARE INFORMATION

Doctors, nurses, other healthcare providers and patients themselves are constantly recording all kinds of data to monitor disease status. Clear and standardized methods of recording and sharing healthcare information are essential for accurate diagnosis and the best care. 'Registration at the Source' (Registratie aan de bron) is a nationwide initiative by Citrienfonds to standardize patient records and promote digital data sharing as a cornerstone for accurate care. Especially for online multidisciplinary teams treating patients, it is important that all professionals have the same information. Information that can be easily shared and reused multiple times avoids creating additional work for care givers. Sharing information regionally to expand care networks and make the best available care accessible for all patients is also an important goal of the program.

DIGITAL IMAGE EXCHANGE

Another essential element in expanding regional networks is the exchange of medical images and information. Professor of Hepatobiliary Surgery and Transplantation at Amsterdam UMC Geert Kazemier: "If you tell patients that we still do that with faxes and DVDs, then of course everyone thinks that is rather quaint, including the 85-year-old patient." The initiative DVDexit aimed to implement digital image networking at all hospitals within the Netherlands within a year. This important milestone was given a major boost by the COVID-19 pandemic, which required new online and remote methods of healthcare service delivery during the crisis. Thanks to DVDexit, every hospital in the Netherlands is currently connected to share medical images digitally.

TIMELY TREATMENT FOR PATIENTS WITH BRAIN TUMORS

Based on the success of the expert panel for colorectal liver metastases, neurologists Dr. Tjeerd Postma, Dr. Mathilde Kouwenhoven, and neurosurgeon Prof. Philip de Witt Hamer formed an online multidisciplinary triage panel in neuro-oncology.

In medical terms, triage means to quickly assess a medical condition to decide the urgency of treatment. The neuro-oncology panel aims to optimize the referral process for newly diagnosed patients with brain cancer. "For some patients with a brain tumor, the sooner treatment can start the better," says neurologist Dr. Maaike Schuur. "A fast and appropriate referral could also reduce emotional distress for cancer patients." Medical doctor and PhD student Merijn de Swart further explains the importance of timely referral: "Our experience shows that consideration by the neuro-oncology triage panel results in more patient-tailored referrals and reduced lead times to treatment, without increasing the costs and required time of health care professionals."

The triage panel is composed of over 20 experts, neurologists, neurosurgeons, radiologists, and radiation oncologists. Seven regional hospitals are affiliated with the triage panel and can digitally refer patients with the suspicion of a brain tumor. The panelists meet online 3 times a week to discuss shared medical imaging and treatment advice. Patients are then referred to the appropriate caregiver. In the study period between February 2019 and March 2020, the neuro-oncological triage panel has made recommendations for 72 patients with an average reduction of 13 days from time of initial diagnosis to treatment.

Dr. Maaike Schuur: "Implementation of this online triage panel was feasible and beneficial in neuro-oncological care. We believe that this concept is promising, valuable, and useful for other care processes that require the collaboration and coordination of multiple medical specialties as well. We aim to provide a helpful blueprint for implementation of a multidisciplinary triage panel."

Neurologist Dr. Maaike Schuur participates in a digital multidisciplinary discussion of brain tumor patients.

photo by Anita Edridge

TRANSLATING RESEARCH INTO SUSTAINABLE HEALTHCARE

Oncode is an independent institute dedicated to understanding cancer and translating research into practice. Oncode has a team of professionals in place to organize the collaborative efforts of 62 oncology research groups across the Netherlands. Together with ZonMw, Oncode focuses on studies that can lead to sustainable, implemented healthcare.

Oncode Investigator Prof. Jan Paul Medema, Dr. Maarten Bijlsma, and Prof. Hanneke van Laarhoven received funding from Oncode for guided therapy in a specific type of esophageal cancer: esophageal adenocarcinoma. The bulk of these tumors consist of non-malignant cells and tissue (stroma) that produce substances that inhibit chemotherapy and promote tumor growth. This phase II clinical trial aims to find out how safe and effective the addition of a stroma-targeting agent is to the standard care of esophageal cancer. This highly efficient and fast translation of research to clinical testing exemplifies the power of the multidisciplinary collaborations.

PROMOTING NATIONWIDE COLLABORATION ON PANCREATIC CANCER

The Delta Plan on Pancreatic Cancer, 'Deltaplan Alvleesklierkanker', was initiated to foster progress in research, early detection, and better treatments by emphasizing widespread collaboration to achieve better outcomes for pancreatic cancer patients. Although much progress has been made in improving survival for nearly all kinds of cancer over the past 30 years, pancreatic cancer remains one of the deadliest types of cancer. Amsterdam UMC is one of 15 expertise centers in the Netherlands who have partnered with the Dutch Pancreatic Cancer group, patient organization Living with Hope, and the Stomach Liver Bowel Foundation (Maag Lever Darm Stichting) in this unique nationwide initiative. Delta Plan partners think beyond the walls of their own hospital and work together to exchange the latest insights and implement new treatments. The Amsterdam UMC departments of surgery, gastroenterology and hepatology, medical oncology, radiology, radiation oncology, and pathology are broadly represented.

"We are a front runner in the fight against pancreatic cancer, but we have not yet won.

Prof. Marc Besselink, Professor of Pancreatic and Hepatobiliary Surgery.

COLLABORATIONS INVESTIGATING RARE CANCERS

USING THE FORCE OF COLLABORATION

The Dutch Cancer Society has granted € 3.2 million for the FORCE collaboration - UMC Groningen, UMC Utrecht, Erasmus MC, Amsterdam UMC and Maxima Medical Center - for research into rare tumors. In this partnership, researchers are building a national infrastructure that makes information about rare tumors accessible to doctors and researchers nationwide. This data collection makes it possible, for example, to determine which traces of rare tumors are detectable in a blood sample. FORCE wants to contribute to better and faster detection of rare cancer by developing ultra-sensitive blood tests. From Amsterdam UMC, Prof. Els Nieveen van Dijkum, Dr. Heinz Josef Klumpen, Dr. Anton Engelsman, and Dr. Koen Dreijerink are involved in this project.

COHERENT DATA COLLECTION

The COHERENT project received € 1.6 million to improve the diagnosis of rare hematological cancers and promote tailored therapies for affected patients. This infrastructure project will work on standardizing protocols, assays, and data collection from expert centers in the Netherlands to improve the collection of quality data and annotated biomaterials necessary for research. At Amsterdam UMC, Profs. Jacqueline Cloos and Arnon Kater, members of the Expertise Center for Rare Hematologic Cancers, are involved in this project.

A CENTRALIZED COLLECTION OF BIOFLUIDS FROM PATIENTS FOR CANCER RESEARCH

In recent years, advances in technology have revealed a wealth of information contained in biofluids – a sample of blood or urine – including detailed information about cancer. Biofluids collected from patients to be analyzed for information about their cancer are called liquid biopsies. The Liquid Biopsy Center at Cancer Center Amsterdam coordinates and provides access to a centralized collection of biofluids from patients for cancer research. The high-quality, uniformly processed, and well annotated collection makes the Liquid Biopsy Center a prime resource facility for cancer researchers.

"Blood is filled with valuable information, it can tell us such things as whether we have a tumor, how it is developing, where it is located, what it is made of, and how it will respond to certain treatments." - Dr. Michiel Pegtel, Head of the Cancer Center Amsterdam Liquid Biopsy Center.

THE PROMISE OF LIQUID BIOPSY

Using liquid biopsies to investigate cancer is still at an early stage but the value of liquid biopsies is already proving itself for some tumor types. The information contained in biofluids is being used to develop novel patient-friendly non-invasive tests ranging from earlier cancer diagnosis, more accurate cancer prognosis, to better treatment selection. In addition, liquid biopsies can be used to monitor response to treatment and allow for adjustments in the therapy to prevent ineffective treatment and potential side effects.

Artificial Intelligence and Machine Learning

The potential of artificial intelligence (AI) to fuel progress in all aspects of cancer research and treatment is undeniable. AI's ability to find hidden patterns and gather insights from vast volumes of data is accelerating progress in everything from drug discovery to surgical robots. We are currently deploying and developing AI for both research and clinical applications. However, we are still learning, as progress through AI demands new knowledge and skills.

A RANGE OF POSSIBLE TREATMENT PLANS

Machine learning is a type of AI that uses self-learning algorithms that enables highly accurate predictions of outcomes. One example is software recently developed at the Department of Radiation Oncology that quickly proposes multiple radiation treatment plans for patients with prostate cancer.

Arjen Bel, Professor of Radiotherapy Physics, Department of Radiation Oncology, explains: "While Amsterdam UMC has performed research using computer support for radiation treatment plans for years, the challenge was to make quality plans quickly. Our AI software is based on a self-learning evolutionary algorithm that display intelligent search behavior. It calculates a range of possible treatment plans while balancing the proper radiation dose and possible side effects." In a blind test during the software's testing stage, nearly all radiation oncologists preferred the new AI-based treatment plans over those formulated by current standard practices.

One great advantage of the developed AI-software is that it can be expanded to make radiation treatment plans for multiple forms of cancer. With funding from Dutch Cancer Society, Amsterdam UMC, and Elekta (the radiation equipment manufacturer), the research will be expanded on a national scale.

DEEP LEARNING FOR ANALYZING MEDICAL IMAGES

Advanced medical image analytics is increasingly used to predict clinical outcome in cancer patients. With the use of radiomics, hundreds of disease features can be extracted from a single medical image. Deep Learning algorithms provide powerful tools to mine the huge amount of image data available to identify patterns and classify different types of information. Deep Learning AI is based on layered algorithms that form neural networks similar to a human brain.

- Ronald Boellaard, Professor of Neuroscience and with support by Hanarth Fonds, is using AI to improve prognosis and treatment response prediction based on advanced imaging (FDG PET/CT) studies of diffuse large B-cell lymphoma patients.
- Dr. Pim de Graaf, together with colleagues of the Dutch Retinoblastoma Center and supported by a Hanarth Fonds grant, is assessing the value of AI-guided radiomics for the detection of subtypes of a rare form of pediatric eye cancer and to identify risk factors for developing distant metastasis.
- Martijn van Oijen, Associate Professor in Medical Oncology, is developing and evaluating practical clinical decision tools created by AI for patients with cancer of unknown primary origin, providing greatly needed support to improve treatment effectiveness for these rare cancers.

SURGICAL PROGRESS SUPPORTED BY ARTIFICIAL INTELLIGENCE

To improve the selection of patients with liver tumors who will benefit from surgery, Nina Wesdorp and Prof. Geert Kazemier of the Surgery Department Amsterdam UMC are working in collaboration with analytics software leader SAS to optimize tumor response evaluations using AI. "By applying AI to medical imaging like CT scans, we are developing models that can automatically perform a tumor response evaluation," says Wesdorp. "In addition, with the help of AI, much more image features can be extracted from CT scans, which are not visible or quantifiable with the naked eye. We use these image features to develop advanced models to predict the effectiveness of a treatment."

> Predictive models based on advanced computing could allow early identification of patients who will respond well to treatment.
>
> Nina Wesdorp, Research Associate, Surgery.

Artificial Intelligence is being used to improve neurosurgical decisions for patients with brain tumors. From left to right: Prof. Philip de Witt Hamer (neurosurgeon and brain tumor specialist), Dr. Roelant Eijgelaar (postdoc neuro-oncological imaging), and Ivar Kommers (PhD student and neurosurgeon in training).

ARTIFICIAL INTELLIGENCE-ASSISTED RESEARCH

Today's scientific technologies can generate an enormous volume of data from a single experiment. Our cancer researchers are utilizing AI and machine learning to gain insights from 'big data' and to build models of the complex interactions within tumor cells and their environment. The resulting advancement in our understanding of cancer biology can be translated into the development of more precise and improved therapies. "Computational analyses and the ability to interpret high-throughput analysis-based results are quickly becoming essential skills for all researchers," says Roel Verhaak, Professor of Computational Biology of Brain Tumors.

- Roel Verhaak, Professor of Computational Biology of Brain Tumors, is focusing on data mining algorithms to build models of complex molecular interactions in brain tumor cells to better understand the aberrant biology of cancer.
- Bart Westerman, Associate Professor of Neurosurgery and Cancer Biology and Immunology, is applying AI models to big datasets combining information about protein structures, genomics, and scientific literature to identify and facilitate targeted drug therapies against cancer.
- Thomas Würdinger, Professor of Preclinical Neurosurgery, is using self-learning and swarm intelligence algorithms to find new cancer biomarkers in blood samples.

ACCELERATING PROGRESS IN ARTIFICIAL INTELLIGENCE

Amsterdam's ambitious 'AI Technology for People' initiative marked the opening of the VU Campus Centre for AI & Health. AI Technology for People is a regional collaborative partnership involving Amsterdam UMC and a collective investment of € 1 billion over the next decade.

https://amsterdameconomicboard.com/en/news/amsterdam-coalition-publishes-special-ai-edition-in-new-scientist

ADAPTING TO A PANDEMIC

Achieving progress during the COVID-19 pandemic has been challenging, requiring innovation and flexibility. There has been enormous pressure on all our professionals, students, patients, and volunteers. As we safeguarded each other's health, we succeeded in finding ways to continue research and education in addition to caring for patients with cancer.

> This pandemic has led to new ways of working together, and we should try to keep the best changes after the pandemic is over.
>
> Prof. Ben Slotman.

ADVANCING RESEARCH: CLINICAL TRIALS DURING THE PANDEMIC

Worldwide, clinical trials were disrupted by the pandemic. Scientists and medical professionals worked hard to minimize the impact of COVID-19 on their endeavors to find better treatments for patients with cancer.

Niels Wondergem, PhD student at the department of Otolaryngology and Head and Neck Surgery, was excited to begin investigating if a type of immunotherapy administered before surgery would make a difference for advanced oral cancer patients. But the pandemic intervened. "Our NeoNivo neoadjuvant immunotherapy trial for patients with oral cancer was suspended for four months," says Niels. Social distancing and isolation measures to safeguard potentially vulnerable patients from SARS-Cov-2 made it a huge challenge to enroll new patients, especially since various medical professionals from different departments needed to be involved to provide care.

Niels Wondergem: "When we finally received an 'all clear' to continue the study, the enrollment of new patients went very well. Of course, our medical research team was very motivated to make up for 'lost' time and make progress in the treatment of our patients. We were also very well prepared logistically to welcome new patients after the temporary stop, with all health safe-guarding measures in place."

Although the temporary halt meant that the study's end date had to be postponed, the NeoNivo neoadjuvant immunotherapy trial has currently enrolled 13 of 15 intended patients and is proceeding as planned with an estimated end date later in 2022.

https://clinicaltrials.gov/ct2/show/NCT03843515

CONTINUED SUPPORT FROM THE CRISPR EXPERTISE CENTER

The CRISPR Expertise Center offers researchers full–spectrum support in the use of the revolutionary gene-editing technology called 'CRISPR'. To help Amsterdam UMC stay at the forefront of this rapidly evolving field, our CRISPR experts regularly organize courses for PhD students and international seminars featuring leading researchers in the field.

"Mainly through online meetings, the Cancer Center Amsterdam CRISPR Expertise Center has continued to provide support, and design and perform successful gene editing experiments. A strict schedule was implemented to perform our laboratory work while complying with COVID-19 regulations like social distancing. In addition, we organized a CRISPR course for the Oncology Graduate School Amsterdam. Together with a panel of national and international top speakers, we discussed the latest developments of the technology, and challenged PhD students with new applications of CRISPR in their projects." Dr. Rodrigo Leite de Oliveira, manager of Amsterdam UMC Cancer Center Amsterdam CRISPR Expertise Center.

https://www.amsterdamumc.org/research/core-facility/crispr-expertise-center.htm

ONLINE EDUCATION: ONGOING TRAINING FOR PHD STUDENTS IN ONCOLOGY

Oncology Graduate School Amsterdam (Onderzoekschool Oncologie Amsterdam) is a joint graduate school of the Amsterdam UMC (location AMC & VUmc) and NKI-AvL, dedicated to the training of more than 850 PhD students working in the field of Oncology. In 2020, the Oncology Graduate School rose to the challenge of the pandemic and took their courses online.

"We are very proud that we have managed to maintain our course program during the COVID-19 pandemic. We converted all our courses to online platforms, thanks to the flexibility of the course organizers, teachers, as well as the PhD candidates. In addition to lower (internal) costs, a great advantage of online courses was that PhD students who were working abroad could easily continue to participate in our educational program." Dr. Esther Ruhé – Coordinator of Oncology Graduate School Amsterdam.

A VLOG FOR MEDICAL INTERNS

Because of the COVID-19 pandemic, medical interns were no longer able to experience education by visiting hospital patients under the supervision of an expert physician. "That's why I started vlogging together with the 'digi-team' of intern volunteers: the camera follows my interaction with patients to provide education about real-life care," says Dr. Susanne van der Velde, surgical oncologist.

She continues: "At first it seems strange: online education for a profession that demands hands-on clinical interaction. But, our vlogs are very informative and were very well received. Also, the increasing focus of Amsterdam UMC on treating complex diseases narrows the clinical diversity our physicians encounter. In the vlogs, we are able to expose interns to a wide range of clinical cases, which is very important at this early stage in their careers."

Surgical oncologist Dr. Susanne van der Velde vlogging with her mobile phone.

COVID-19 care beyond patients

The SARS-Cov-2 pandemic instigated very unusual circumstances at our intensive care units: loved ones were severely restricted from visiting critically ill COVID-19 patients.

In March 2020, the pandemic hit the Netherlands and the intensive care units (ICU) at Amsterdam UMC were suddenly filled with critically ill COVID-19 patients. Considering the enormous strain on our medical professionals and ICU capacity, on top of social distancing and quarantine restrictions, patients' visits by loved ones became severely restricted.

> Imagine not being able to see, touch, and mentally support your loved one in intensive care.
>
> Chantal du Perron, internist-oncologist at the department of Medical Oncology.

To support the loved ones of COVID-19 patients hospitalized in our ICU, Chantal Du Perron organized teams with other medical professionals from numerous disciplines at VUmc and AMC locations, including cancer care. Team members acted as an extension of the treating physicians by providing family and friends with daily updates on the condition of the patient. In addition, they also served as gatekeepers for the wellbeing of involved loved ones by offering support or referrals to specialist care when needed.

Currently, research on how loved ones and health care workers experienced this support is being compiled with the aim to optimize this approach for future situations.

Teams were also organized to support Amsterdam UMC staff members themselves.

> Under these extraordinary circumstances, our medical professionals from different disciplines worked together and succeeded to manage the enormous strain on our care provisions. I am very proud of the courage, resilience and tireless efforts of our medical staff through these extremely challenging times.
>
> Prof. Geert Kazemier.

From left to right: Prof. Mark van Berge Henegouwen, Dr. Roos Pouw, Dr. Sarah Derks, Prof. Roel Bennink, Dr. Maarten Hulshof, Loes Noteboom, Chantal 't Hoen, Dr. Suzanne Gisbertz, Dr. Alice Bakker and Caroline van Nobelen.

MOVING FORWARD TOGETHER

Against the background of the COVID-19 pandemic, we have continued to do a lot of good work together. The blending of departments between the locations AMC and VUmc has continued, with challenges being met with flexibility and commitment to shared goals. Through joining forces, we continue to improve health outcomes for our patients with cancer.

Joining forces to improve care for esophageal and gastric cancer patients

In 2020, care for patients with esophageal or gastric cancer was centralized within Amsterdam UMC at our VUmc location. What did it take to centralize care for these patients? And what are the benefits?

Following the establishment of Amsterdam UMC in 2018, the blending of different medical departments at locations AMC and VUmc has been conducted in several carefully planned phases. Amsterdam UMC is the largest center in the Netherlands - and one of the largest in Europe - in the treatment of esophageal and gastric cancer, performing complex surgeries on more than 250 patients annually.

IMPROVING COMPLEX CARE

"Patients with these tumors need complex care," says Surgeon Mark van Berge Henegouwen, Professor of Gastrointestinal Surgery. "There are many medical professionals involved in the treatment before, during, and after surgery. Almost all of these patients receive chemotherapy, radiation, or a combination of both, prior to surgery. This requires an intensive collaboration of medical experts from nurses, dieticians, anesthetists to surgeons.

"The surgical procedures are also technically demanding. For example, during an esophageal operation you may have to operate in the abdomen, in the chest, and in the neck. This increases the risks of complications. However, the more often you perform such an operation, the more experience and skills you and your team gains. The benefit of the centralization is that we will see more patients and can therefore achieve better care results."

MAINTAINING HIGH CARE STANDARDS

Prof. van Berge Henegouwen was concerned about the move, partly because in the beginning there was uncertainty about how many and which colleagues from the care pathway could move as well. “How do you organize this move without jeopardizing patient care? That was our top priority. In previous years, we had made good progress in improving care for patients with fewer complications as a result. Obviously, we wanted to maintain the highest care standards. But how do you organize that when blending organizations?”

PREPARATION, PREPARATION, PREPARATION

“In the run-up to the move, we did an incredible amount of work in preparation. This preliminary work was essential for a flawless execution. Many different people contributed with insights and advice to map out all possible scenarios in advance, to draw up protocols, to indicate which colleagues had essential roles, and to determine if these professionals could move at all.”

GOOD RECEPTION

“Settling into our new location, everyone just made us feel very welcome, not only within our department, but all departments at location VUmc. Of course, there were differences, but you must handle these flexibly. Merging only works if you do not focus on the differences, but rather on the similarities and the common goals. We had to get used to working at the VUmc location, but the colleagues here also had to get used to us. That is just part of it. The most important thing is that everyone has been very open to this. You have new people to work with, you have to invest in new connections, that is essential to be successful.”

REDUCING LENGTH OF HOSPITAL STAY

Prof. Van Berge Henegouwen emphasizes the importance of the ‘care path’ for achieving the best clinical results. A care path provides a clearly defined step-by-step treatment protocol for patients to minimize variations in clinical practice, thereby improving the quality of care and efficiency. “Our care provisions start at the moment the patients arrives and every step is precisely planned, right up until the moment that the patient goes home about a week later.”

Prof. Mark van Berge Henegouwen *photo by Anita Edridge*

During the merger, the physician assistants, whom the patients see every day, were crucial for ensuring implementation of the care path. Now, Amsterdam UMC has one of the shortest hospital length of stay for these patients in the Netherlands. This is a very important achievement, especially during the pandemic when hospital beds are in high demand.

PROGRESS FOR PATIENTS

Now that the merger is complete, what are the results? “We have now operated on more than 200 patients at our new location and the results are very good,” says Prof. Van Berge Henegouwen. For example, ‘anastomotic leakage,’ a leak that can occur after tumor removal and reconstruction of the gastrointestinal tract, is a potential serious complication for the patient. “With the help of technical innovations, we have been able to reduce the incidence of this complication from previously 1 in 10 patients to now 1 in 20. That is a major improvement.”

CONTINUING IMPROVEMENTS

And what is next? “We want to continue to improve, and we are doing this by constantly analyzing our results to find areas for improvement. Thanks to the Cancer Center Amsterdam Foundation, we now have a very advanced surgical robot: the ‘Da Vinci Xi’. This, in turn, gives a new impulse to innovation and care improvement. Also, we have new regional partnerships and our successful care path is being implemented at other hospitals. In addition, more and more complex patients with esophageal or gastric cancer are being referred to our center, first regionally, but also nationally. We are already seeing an increase in complex patients, and I am confident we have the right team at the right location to give these patients the best care possible.”

CREATIVITY IN FUNDRAISING

Despite the pandemic, our volunteers and fundraisers have continued their dedicated efforts, finding creative ways to keep making a difference. We deeply appreciate our supporters' generosity and the huge efforts of our volunteers and fundraisers. Although the pandemic may have kept us physically apart, we have pursued and found many ways to connect and move forward.

VIRTUAL ENCOURAGEMENT FOR TCS AMSTERDAM MARATHON RUNNERS

As a result of COVID-19 pandemic, the TCS Amsterdam Marathon had a virtual start on Sunday, October 18, 2020. With the help of the Official Virtual Run App, powered by TCS, competitors ran their distance on a route of their own choosing. Anticipating what would be missing in the digital marathon - the encouragement from Amsterdam fans along the way - TCS, the title sponsor for the 10th year, together with producer Max Krul, aka MACKS, developed a mix tape with 3D sound bites of genuine Amsterdam support. With this fantastic audio track, socially-distanced runners experienced inspiration through music, sounds of the cityscape, and cheers of encouragement as they ran their virtual marathon.

FROM AMSTERDAM TO AMSTERDAM, WITH LOVE

Dozens of Amsterdam natives recorded their encouragement as audio clips at the start of the mix tape to help runners through difficult moments. MACKS developed an hour-long audio track for marathon runners with the sound bites. The audio track sounds lifelike because all of the wishes, cheers and encouraging words that were recorded in 3D, this resulted in an experience which makes it seem as if you are being encouraged from all sides by spectators along the route.

The track 'This Run Amsterdam' by MACKS is available on Apple Podcast via https://podcasts.apple.com/gb/podcast/this-run-amsterdam/id1534917974

RUNNING SISTERS

The combined efforts of volunteers are of enormous importance to raise funding for cancer research. This is the story of two dedicated volunteers and their involvement in the TCS virtual marathon.

Venezuelan Ailed Izurieta moved to the Netherlands in 2001. Her friend Maria Ines Villasmil had already emigrated to the Netherlands a few years before to study choreography. "We were both working as dancers in Venezuela," say the two, who in their new homeland see themselves more like sisters than just friends. Maria Ines works at the Amsterdam School of the Arts as a dance teacher at the Academy for Theater and Dance and is currently interim director of this institute. Ailed works as a nutritional assistant in the Onze Lieve Vrouwe Gasthuis (OLVG) hospital and wants to train to be a doctor's assistant.

Ailed: "At a certain point, I decided to travel and visited Maria Ines in the Netherlands. I saw a lunchtime concert by saxophonist Ties Mellema at 'De Griffioen' [the cultural center of the VU University]. Afterwards, I came to talk to him and immediately thought, what a nice man." Maria Ines adds: "It was love at first sight between the two." Ailed eventually decided to settle in the Netherlands.

"We are grateful for the tremendous support we have received since 2012 through the TCS Amsterdam Marathon," said Geert Kazemier, surgeon and Director of Cancer Center Amsterdam Foundation at Amsterdam UMC. "This financial contribution is used for cancer research that examines whether and how physical exertion and lifestyle changes before and during treatment have a positive impact on survival and quality of life with cancer. We find it inspiring that TCS, together with organizer Le Champion and everyone else involved, has found a virtual alternative to participation in person."

The 'Running Sisters' after the finish in the 2017 edition of the Amsterdam marathon. From left to right: Ailed and Maria Ines.

HODGKIN'S DISEASE

Ailed and Ties' happiness took a dramatic turn in 2015. "During the holidays, Ties had a lot of pain in his breastbone. After a scan and biopsy at the OLVG, we got the result: Hodgkin's disease," says Ailed. "We were referred to Prof. Josée Zijlstra of the Hematology Department at Cancer Center Amsterdam." Intensive treatments followed. When those were over, Ties, Ailed and Maria Ines wanted to do something in return to show appreciation for the care and support they received at Cancer Center Amsterdam.

In October 2016, Ties organized a benefit concert in the Muziekgebouw aan 't IJ, the proceeds of which were donated for research into blood tests for the treatment of cancer. Ailed and Maria Ines also surprised the employees of the Hematology Department with 'Pan de Jamón', a typical Venezuelan festive dish. "We heard during that time that Cancer Center Amsterdam was the charity of the TCS Amsterdam Marathon," says Maria Ines. Together with Ailed, they joined team Cancer Center Amsterdam and enthusiastically raised funds through the online platform. "I don't really like running at all," admits Ailed. "But Maria always knows how to encourage me. It feels so good to be able to give something back in this way. We also feel very welcome in the team. The personal welcome in 'the clubhouse', the involvement of all the runners - from doctors to researchers. On that day, there really is a 'we're doing it together' feeling." Ailed and Maria Ines have now participated in TCS Amsterdam Marathon five times, and raised around € 4,500 from family and friends.

VIRTUAL MARATHON

In 2020, the 'Running Sisters', as they call themselves on the online platform, participated in a promotional video for the Marathon. "It was a very bizarre experience," says Ailed. "The entire marathon took place virtually because of the corona pandemic. At exactly 00.00 we started and ran, followed by a camera crew, through what felt like an abandoned city. We hope that the marathon will continue 'as usual' in 2021 and that we can meet our fellow runners again in the Frans Otten Stadium."

"And maybe I will get Ailed to participate in the half marathon," Maria Ines expresses hopefully. Both: "And of course we will also raise money for the important work of Cancer Center Amsterdam!" And how are things with Ties now? In 2017, he had a relapse for which he underwent an autologous stem cell transplant. He is doing well now; the fatigue is less. As a vulnerable patient, he received his COVID-19 vaccination at the end of March and his new CD was released on April 22.

Text: Joke van Diemen-Markx.

Simone and Maerten van Seggelen *photo by Philippe van Seggelen*

Inspiring donors

Longtime fundraiser and supporter Simone van Seggelen describes her gentle, yet firm approach to potential donors: “I approach people nicely, but also a bit forward.”

GIVING A GENTLE PUSH TO POTENTIAL DONORS

To her great sadness, Simone van Seggelen had to say goodbye to her husband Maerten in the spring of 2020, when he died of cancer. They had been married for more than 50 years. She says: “It was so sad. Because of the coronavirus, I could not give him the beautiful goodbye that he wanted so badly.”

“Maerten became ill in 2004 and was operated on in Rotterdam. After two years, he developed metastases and was advised to get radiotherapy. He didn’t want that at first.” After a second opinion at Cancer Center Amsterdam, he did opt for this treatment. “It always felt very good in Amsterdam,” says Simone. “I heard about the Cancer Center Amsterdam Foundation, so I attended an informative meeting with Maerten. It soon became clear to me - I wanted to give something back.”

Simone and Maerten became more than donors to the Cancer Center Amsterdam Foundation. “A new initiative was being launched to ask as many people as possible to become ‘family’ to financially support cancer research. I joined this initiative, and in recent years helped organize various successful events.”

During the information evenings for the Cancer Center Amsterdam family, Simone is always one of the regular guests and she also always brings guests with her. “I have always worked in the advertising world and there I have learned to approach people nicely, but also a bit forward. I’ve always had a large network, partly due to Maerten’s work as a retailer. So, when the right time comes, I approach people and tell them about the fantastic work of Cancer Center Amsterdam.” Like Simone herself, these people are often immediately impressed by the enthusiasm of director Geert Kazemier and his team. “After that, it’s not that difficult to give them the last gentle push and ask to become a donor,” says Simone. Cancer Center Amsterdam has already welcomed many new ‘family members’ thanks to Simone’s efforts.

Two years ago, Maerten received some bad news. “Metastases again were found, and he was prescribed hormonal treatment. The last year and a half, however, things got worse and then I had to let him go.” She concludes: “But I will continue to work for Cancer Center Amsterdam for as long as I can, because enormously important work is being done there that deserves support.”

Text: Joke van Diemen-Markx.

photo by Claudia Kamergorodski

GROUNDBREAKING PROFESSIONALS

Every breakthrough in cancer treatment begins with the act of imagination. Working at the frontier of science, our groundbreaking professionals turn imagination into innovations, and innovations into reality. Their research empowers progress against cancer by increasing our understanding of the disease, and then translating this knowledge into new and increasingly precise ways to prevent, detect, diagnose, treat, and cure. Here, we highlight some achievements from 2020.

Research empowers progress against cancer by increasing our understanding of the disease, so we can translate this knowledge into new and increasingly precise ways to prevent, detect, diagnose, treat, and cure.

QUEST FOR MEDICATION TO PREVENT COLON CANCER

Professor Evelien Dekker, Department of Gastroenterology and Hepatology, Amsterdam UMC is second author on a study published in the prestigious New England Journal of Medicine.

The report describes the outcome of a clinical trial testing medicinal strategies to prevent tumor formation in patients with hereditary colon cancer called familial adenomatous polyposis (FAP). These patients develop hundreds to thousands intestinal polyps that turn cancerous if untreated. “Currently, the care for these patients involves surgery to remove the colon at a young age, in combination with life-long monitoring by endoscopic screening and treatment, and often recurrent operations,” says Prof. Dekker. “Otherwise, affected individuals will develop full blown tumors before they are even 40.”

NEW MEDICATIONS HOLD PROMISE

The current preventive surgical treatments have side effects, however, and can significantly reduce quality of life. The clinical trial aimed to determine if a combination of medications can reduce occurrence and growth of intestinal polyps. Previous clinical research had shown than non-steroid-based anti-inflammatory drugs (NSAID) and ‘eflornithine’, a medication for African sleeping sickness, could be effective against sporadic adenoma-growth. “Naturally, our question was: would this combination of medicines be beneficial for FAP patients?” says Prof. Dekker.

CLINICAL TRIAL WITH RARE PATIENTS

Due to the rarity of FAP, Prof. Dekker collaborated with over 20 medical and research centers in Europe and the United States and enrolled 171 patients in the clinical trial. Participants were randomly assigned to one of three treatment groups: (1) sulindac (NSAID) only, (2) eflornithine only, or (3) both medicines combined. Patients were followed for up to four years and disease progression was assessed by examining intestinal polyp growth, and the number of patients requiring endoscopic removal of advanced polyps or colon surgery.

> “To have so many rare patients participate here in Amsterdam, and through our international collaborators in Europe and the United States, that by itself is a major achievement.”
>
> Prof. Evelien Dekker.

OUTCOME AND PROSPECTS

This study was the largest and longest clinical trial with FAP patients ever. Prof. Dekker explains: “Careful analysis of our data revealed that patients taking the combination treatment showed a similar disease progression as those taking the single drugs. Obviously, we had hoped to see an improvement. But this is how clinical progress is being made: you ask an evidence-based question, and design a clinical trial to obtain clear answers and more knowledge to build on.”

Next step? “Importantly, our data analyses are still ongoing to focus on patient-subgroups and here we do see a remarkable difference: with the combination treatment none of the pre-colectomy FAP patients required surgery, in contrast to similar patients on monotherapy.” Within these and other collaborative networks for FAP patients, researchers continue to perform trials pursuing optimal treatment strategies and test other potential preventive medications which are supported by evidence from pre-clinical studies. “We strive to seize opportunities to reduce polyp growth in FAP patients,” says Prof. Dekker. “If we can prevent debilitating surgeries and invasive treatments for these patients by medication and/or non-invasive endoscopic treatments, that would be amazing progress.”

For more information: Dekker, E., et al. (2020) Eflornithine plus Sulindac for prevention of progression in Familial Adenomatous Polyposis. New England Journal of Medicine 383:1028-1039.

https://www.nejm.org/doi/full/10.1056/NEJMoa1916063

Innovative research on the covers of high impact scientific journals

The impact of our scientific achievements was highlighted by being showcased on the cover of acclaimed international journals.

WHAT A BLOOD SAMPLE CAN REVEAL ABOUT BRAIN CANCER

Exciting new diagnostic insights into brain tumors were spotlighted on the cover of Cell Reports Medicine. Nik Sol, the leading author of the publication, says: “Our study investigated the use of blood platelets to identify potential biomarkers for the clinical management of certain brain tumors to improve patient survival as well as their quality of life.” The analysis of genetic profiles from isolated blood platelets revealed differences between patients with advanced brain cancer, early-stage brain tumors, multiple sclerosis, and healthy volunteers. Importantly, platelet-derived genetic profiles may indicate whether a brain tumor is progressing or is responding to radiotherapy. In the future, these new findings can improve the personalized care of patients with glioblastoma brain cancer. This publication was part of the PhD thesis of Myron Best. He successfully defended his PhD thesis on October 1, 2020.

Read more: Sol, N., et al. (2020). Tumor-educated platelet RNA for the detection and (pseudo)progression monitoring of glioblastoma. Cell Reports Medicine 1: 100101.

https://linkinghub.elsevier.com/retrieve/pii/S2666379120301270

https://www.amc.nl/web/nieuws-en-verhalen/actueel/actueel/promovendus-op-voorkant-cell-medicine-reports.htm

PROMISING NEW IMMUNOTHERAPY AGAINST CANCER WITH THE HELP OF LLAMAS

Groundbreaking research from the lab of Dr. Hans van Vliet was highlighted on the cover of Nature Cancer. The leading author of the publication, Roeland Lameris explains: "Immunotherapy is a promising new approach to treat cancer. The patients' own immune system is activated to recognize and destroy cancerous cells. In our research, we took advantage of the unique features of antibodies from llamas, also called 'nanobodies'. We succeeded in generating llama antibodies that specifically bind to distinct tumor cells as well as specific human immune cells. In a preclinical setting, the generated nanobodies precisely linked the immune cells to cancerous cells of the bone marrow, prompting a vigorous anti-tumor response." To translate the broad clinical potential of llama nanobodies into actual cancer therapies, a start-up company Lava Therapeutics was launched with the support of the IXA Alliance office.

Read more:

Lameris, R., et al. (2020). A single-domain bispecific antibody targeting CD1d and the NKT T-cell receptor induces a potent antitumor response. Nat. Cancer 1: 1054-65.

https://www.nature.com/articles/s43018-020-00111-6.

Image source: Erica Tandori, Monash University. Cover Design: Lauren Heslop.

More research highlights

BETTER CHEMOTHERAPY FOR RECURRENT LEUKEMIA

A new drug significantly improves progression-free and overall survival time in patients with recurrent leukemia. Medical centers around the world, including Amsterdam UMC, participated in the MURANO trial, led by Amsterdam UMC Professor of Translational Hematology Arnon Kater. The study confirmed earlier evidence that Venetoclax in combination with rituximab was far superior to previous immuno-chemotherapy for patients with relapsed chronic lymphoblastic leukemia.

Prof. Kater: "The new drug has two major advantages. The prognosis for patients is much better and the side effects are also less." With the new drug, evidence of cancer was undetectable in 57.3 percent of the patients after four years. In the patients treated with the standard drug, this was only 4.6 percent.

https://tinyurl.com/5cjytes5

FIRST EVIDENCE FOR NON-INVASIVE ENDOMETRIAL CANCER DETECTION IN URINE

Researchers from the Department of Pathology together with clinicians from the Center of Gynecologic Oncology (CGOA) of Amsterdam UMC have published a feasibility study in which they demonstrate that endometrial cancer can be detected in urine with high diagnostic accuracy for the first time. First author Dr. Rianne van den Helder reports, "This provides an attractive strategy for non-invasive endometrial cancer detection, and can be used for screening asymptomatic women, triaging women with postmenopausal bleeding symptoms, and monitoring women with increased endometrial cancer risk."

https://doi.org/10.1186/s13148-020-00958-7

"We are proud to see that our professionals have shown tremendous flexibility to make sure that scientific progress continued as before the pandemic."

Prof. Jan Paul Medema.

HEALTHY INTESTINAL FLORA TRANSPLANTATION FOR PATIENTS WITH ACUTE LEUKEMIA

Patients with acute leukemia sometimes receive bone marrow from a healthy donor. Sometimes this goes wrong, and the new bone marrow targets the patient's organs, called graft-versus-host disease. Researchers at Amsterdam UMC have investigated whether a donation of poop from a healthy donor can help some patients avoid this rejection reaction. In an article published in Science Translational Medicine, Dr. Mette Hazenberg and PhD student Yannouck van Lier describe fifteen patients who received a healthy intestinal flora via a fecal transplant. This had a favorable effect in ten patients. The researchers now want to find out which components are responsible for this to develop better therapies for these patients.

https://stm.sciencemag.org/content/12/556/eaaz8926/tab-article-info

Dietician Kelly Silverio Alonso-Duin and the winning poster presentation.

HELPING CANCER PATIENTS MANAGE CHANGES IN TASTE

Patients with cancer receive support and care from a wide range of professionals. Dietician Kelly Silverio Alonso, who specializes in helping oncology patients, developed easy-to-follow guidelines to make food tastier for patients with cancer.

About 55 to 75% of patients receiving chemotherapy experience changes in how food tastes, which can make eating an extra struggle. Sufficient nutritional intake - especially protein - is important to support the best possible outcome and quality of life. Dietician Kelly Silverio Alonso explains: "If someone becomes malnourished, an oncologist is forced to adjust the chemo accordingly. You want to prevent that by eating well."

Kelly worked with the World Cancer Research Fund to develop a simple food flavoring guide for cancer patients. Their poster presentation 'At home with taste control' was chosen from ten posters as the winner of the poster prize at the VoedingsNL congress. A patient-friendly version was developed for use by dietitians when consulting patients. The 'Taste Compass' offers tips on how to flavor food according to tastes the patients still experience and enjoy, such as sweet, sour or unami. "Small additions to the meal can really help," says Kelly. The Flavor Compass is free to nutritionists, courtesy of the World Cancer Research Fund.

https://www.voedingenkankerinfo.nl/smaak/

Dr. Daniela Oprea-Lager became a member of the European Association of Urology. She made important contributions to the Guidelines for Prostate Cancer, published in May 2020.

Scientific Publications 2020

THE BEST VISION IS INSIGHT

In 2020, our researchers continued to gain important new insights into cancer biology, physiology, and therapeutic interventions, resulting in over 1000 scientific publications.

Here, we highlight a very limited number of publications to illustrate the impact of our scientific research in advancing cancer research and care.

- Bleijenberg, A.G.C., et al. (January 2020) Personalised surveillance for serrated polyposis syndrome: Results from a prospective 5-year international cohort study. **Gut** 69: 112-121.
- Oei, A.L., et al. (January 2020) Molecular and biological rationale of hyperthermia as radio- and chemosensitizer. **Advanced Drug Delivery Reviews** 163-164: 84-97.
- Stroes, C.I., et al. (February 2020) Phase II feasibility and biomarker study of neoadjuvant Trastuzumab and Pertuzumab with chemoradiotherapy for resectable human epidermal growth factor receptor 2-positive esophageal adenocarcinoma: TRAP study. **Journal of Clinical Oncology** 38: 462-471.
- Westerveld, H., et al. (March 2020) Definitive radiotherapy with image-guided adaptive brachytherapy for primary vaginal cancer. **Lancet Oncology** 21: e157-e167.
- Steenbruggen, T.G., et al. (April 2020) High-dose chemotherapy with hematopoietic stem cell transplant in patients with high-risk breast cancer and 4 or more involved axillary lymph nodes: 20-year follow-up of a phase 3 randomized clinical trial. **JAMA Oncology** 6: 528-534.
- Kater, A.P., and Melenhorst, J. (May 2020) CAR-T and Ibrutinib vs CLL: Sequential or simultaneous? **Blood** 135: 1611-1612.
- Versteijne, E., et al. (June 2020) Preoperative chemoradiotherapy versus immediate surgery for resectable and borderline resectable pancreatic cancer: results of the Dutch randomized phase III PREOPANC trial. **Journal of Clinical Oncology** 38: 1763-1773.
- Markar, S.R., et al. (July 2020) Implementation of minimally invasive esophagectomy from a randomized controlled trial setting to national practice. **Journal of Clinical Oncology** 38: 2130-2139.
- Voermans, C., and Hazenberg, M.D. (July 2020) Cellular therapies for graft-versus-host disease: a tale of tissue repair and tolerance. **Blood** 136: 410-417.
- Derks, S., et al. (August 2020) Characterizing diversity in the tumor-immune microenvironment of distinct subclasses of gastroesophageal adenocarcinomas. **Annals of Oncology** 31: 1011-1020.
- Van Lier, Y.F., et al. (August 2020) Donor fecal microbiota transplantation ameliorates intestinal graft-versus-host disease in allogeneic hematopoietic cell transplant recipients. **Science Translational Medicine** 12: eAAZ8926.
- Smyth, E.C., et al. (August 2020) Gastric cancer. **Lancet** 396: 635-648.
- Palma, D.A., et al. (September 2020) Stereotactic ablative radiotherapy for the comprehensive treatment of oligometastatic cancers: Long-term results of the SABR-COMET phase II randomized trial. **Journal of Clinical Oncology** 38: 2830-2838.
- Lugtenburg, P.J., et al. (October 2020) Rituximab-CHOP with early Rituximab intensification for Diffuse Large B-Cell Lymphoma: A randomized phase III trial of the HOVON and the Nordic Lymphoma Group (HOVON-84). **Journal of Clinical Oncology** 38: 3377-3387.
- Ossenkoppele, G., and Vyas, P. (October 2020) BCL-2 inhibitor and conventional chemotherapy combinations for Acute Myeloid Leukemia: Shifting from the unfit to the fit patient with AML. **Journal of Clinical Oncology** 38: 3461-3464.
- Priem, B., et al. (October 2020) Trained immunity-promoting nanobiologic therapy suppresses tumor growth and potentiates checkpoint inhibition. **Cell** 183: 786-801.
- Van der Sommen, F., et al. (November 2020) Machine learning in GI endoscopy: Practical guidance in how to interpret a novel field. **Gut** 69: 2035-2045.
- Bleijenberg, A.G.C., et al. (December 2020) Substantial and sustained improvement of serrated polyp detection after a simple educational intervention: Results from a prospective controlled trial. **Gut** 69: 2150-2158.
- Haselager, M.V., et al. (December 2020) Changes in Bcl-2 members after Ibrutinib or Venetoclax uncover functional hierarchy in determining resistance to Venetoclax in CLL. **Blood** 136: 2918-2926.
- Kater, A.P., et al. (December 2020) Venetoclax plus Rituximab in relapsed Chronic Lymphocytic Leukemia: 4-year results and evaluation of impact of genomic complexity and gene mutations from the MURANO phase III study. **Journal of Clinical Oncology** 38: 4042-4054.

Meet our new professors

Progress in cancer research and care would not be possible without our professors. They initiate and direct groundbreaking research, and educate the cancer professionals of tomorrow. Here, we proudly present our 2020 newly appointed professors.

Every breakthrough in cancer treatment begins with the act of imagination. Working at the frontier of science, our groundbreaking professionals turn imagination into innovations, and innovations into reality.

Prof. Niels van de Donk, appointed Professor in Hematology, in particular Multiple Myeloma, as of February 1, 2020. Vrije Universiteit Amsterdam.

Prof. Roel Verhaak, appointed Professor in Neurosurgery, in particular Computational Biology of Brain Tumors, as of September 1, 2020. Vrije Universiteit Amsterdam.

Prof. Gabe Sonke, appointed Endowed Professor in Clinical Oncology, as of June 24, 2020. Faculty of Medicine, University of Amsterdam.

Prof. Els Nieveen van Dijkum, appointed Professor in Surgery, in particular Endocrine Surgery, as of June 16, 2020. Faculty of Medicine, University of Amsterdam.

Prof. Marie-Jeanne Vrancken Peeters, appointed Endowed Professor in Surgical Oncology, in particular Personalized Treatment of Breast Cancer, as of June 24, 2020. Faculty of Medicine, University of Amsterdam.

PhD Graduations 2020

Almost one hundred PhD candidates successfully completed their thesis defense despite the pandemic. For many, both this solemn occasion and festive afterparty were conducted virtually.

In alphabetical order:

- Abis, S.A., 'Improving patient outcomes in colorectal cancer surgery'
- Al-Jamaei, A.A.H., 'Oral and oropharyngeal squamous cell carcinoma epidemiology and targeted treatment'
- Ankersmit, M., 'Innovative molecular image-guided abdominal surgery'
- Arik, B., 'Tip cell: whose side are you on? Endothelial tip cells and non-tip cells in angiogenesis'
- Atema, V., 'Internet-based cognitive behavioral therapy for breast cancer survivors with treatment-induced menopausal symptoms'
- Babion, I., 'MicroRNAs in HPV-induced cervical cancer'
- Bartels, L., 'T-cell engaging antibodies against new tumor-associated targets'
- Berndsen, R.H.A., 'Strategies for optimization of drug combinations'
- Best, M.G., 'Tumor-educated platelets: From RNA to diagnosis'
- Bleijenberg, A.G.C., 'The serrated neoplasia pathway to colorectal cancer: Molecular biology and clinical management'
- Boons, C.C.L.M., 'The daily clinical practice of nilotinib treatment in chronic myeloid leukemia'
- Boshhuizen, J.P., 'AXL as an anchor to combat cancer therapy resistance'
- Bouman, E.W., 'Multidisciplinary treatment of metastatic prostate cancer'
- Chan, J.P.K., 'Disparities in Access to Radiotherapy for Indigenous Populations in Canada and Beyond: a quantitative approach'
- Clercq, N.C. de, 'Gut Microbiota in Host Metabolism and Cancer from biological pathways to novel treatment strategies'
- Cysouw, M.C.F., 'Quantitative imaging of small tumours with positron emission tomography'
- Dallinga, M.G., 'Endothelial tip cells in culture: An in vitro approach for studies of angiogenesis'
- Derks, J.M.M., 'The impact of glioma on brain functioning and vice versa'
- Detering, R., 'Rectal cancer: Trends and hospital variation'
- Dinaux, A.M., 'Surgery in the multimodal treatment of rectal cancer'
- Ediebah, D.E., 'Assessment of health-related quality of life in cancer clinical trials: clinical relevance and methodological barriers'
- Egmond, M.A. van, 'Physical functioning in surgical patients with esophageal cancer: From risk stratification to targeted physiotherapy'
- Elbers, J.B.W., 'Advanced stage head and neck squamous cell carcinoma: What is next?'
- Faramarz, A., 'DDX11 helicase in Warsaw Breakage Syndrome, DNA damage response and sister chromatid cohesion'
- Franken, L.C., 'Surgery for patients with perihilar cholangiocarcinoma: improvements in work-up and outcomes'
- Freen – van Heeren, J.J., 'FISHing out the good guys: enhancing T cell effector function'
- Gavazzi, S., 'Technical developments for MR-based electrical property mapping'
- Groningen, T.J.B. van, 'Intra-tumor heterogeneity and lineage plasticity in neuroblastoma'
- Groof, J.J. de, 'New strategies for endoscopic recognition of Barrett neoplasia'
- Hagens, E.R.C., 'Esophageal cancer treatment: predicting and improving short- and long-term outcomes'
- Hamminga-Vrieze, O., 'Adaptive radiotherapy in head and neck cancer'
- Harmsen, T.J.W. 'Gene editing à la carte: CRISPR/Cas-assisted single base-pair substitution'
- Harten, A.M. van, 'Targeting the cell cycle as treatment for head and neck cancer'
- Heijden, M.C.S. van der, 'Colon cancer dynamics in development, progression and growth'
- Heineke, M.H., 'Passing a strong message: the IgA Fc receptor in health and disease'
- Helden, E.J. van, 'Imaging and translational biomarkers for anti-EGFR therapy in patients with advanced colorectal cancer'
- Hellingman, D., 'Optimization of nuclear medicine techniques to improve clinical management in solid cancers'
- Hofland, T., 'Reinvigorating T and NK cells in chronic lymphocytic leukemia'
- Holtmaat, J.M., 'Making meaning of the effects of meaning centered group psychotherapy for cancer survivors'
- Horrevorts, S.K., 'Antigen delivery to dendritic cells: the route to induce anti-tumor T cell immunity'
- Hout, M.F.C.M. van den, 'Arming the melanoma sentinel lymph node against metastatic spread'
- Jacobse, J.N., 'Cardiovascular disease after breast cancer treatment'
- Jansen, B.H.E., 'Prostate Cancer Imaging with 18F-DCFPyL PET and multiparametric MRI'

- Jansen, I., 'Bladder cancer diagnostics |A digital slide into the future'
- Klaassen, R., 'Quantitative imaging to characterize pancreatic and esophagogastric cancer
- Klaver, C.E.L., 'Locally advanced colon cancer and peritoneal metastases; from biological pathway to treatment strategies'
- Klein, K., 'Clinical aspects in pediatric acute myeloid leukemia'
- Kooten, J.A.M.C. van, 'Improve the night, improve the day: Better sleep (measurement) in pediatric oncology'
- Koster, B.D., 'Application of TLR agonists in cancer immunotherapy: from late to early, from systemic to local'
- Kremer, W.W., Methylation markers for detection and management of women with cervical neoplasia'
- Kruger, D.T., 'Endocrine responsiveness in estrogen receptor-positive breast cancer'
- Labeur, T.A., 'Predicting outcomes and personalizing treatment in hepatocellular carcinoma'
- Leeuwen-Kerkhoff, N. van, 'Dendritic cells: From normal cell function to immunopathogenic involvement in myelodysplastic syndromes'
- Li Petri, G., 'Synthesis and biological evaluation of new imidazo[2,1-b][1,3,4]thiadiazole derivatives: as anticancer and antibiofilm agents, and preclinical investigation of anti LDH-A compounds against malignant mesothelioma'
- Li, R.J.E., 'The sweet key: to unlocking full dendritic cell potential'
- Looijaard, S.M.L.M., 'Geriatric Oncology: the role of skeletal muscle status'
- Machiels, M., 'Optimizing target volume definition and treatment accuracy in esophageal cancer'
- Mackaij, T.M., The Dutch pancreatic cancer project: Towards nationwide improvement of outcomes'
- Meel, M.H., 'Preclinical development of biology-based therapeutic strategies for aggressive pediatric brain tumors'
- Meijer, B.J., 'Maintenance and disruption of intestinal epithelial homeostasis
- Meijer, L.L., 'Micro molecules, major impact'
- Mercieca, S., 'Optimising the definition of the target volume for lung cancer radiotherapy'
- Moekotte, A.L., 'Improving outcomes of minimally invasive pancreas surgery and ampullary cancer'
- Mungroop, T.H., 'Optimizing strategies in pancreatic and hepato-biliary surgery'
- Neefjes, C.W., 'Towards optimal treatment of cancer related symptoms'
- Neijenhuijs, K.I., 'Patient reported measures in eHealth: on measurement properties and data opportunities'
- Nieuwenhuizen, A.J. van, 'Health-related quality of life and survival in patients with head and neck cancer'
- Nieuwenhuizen, D. van, 'Cognitive functioning and quality of life in meningioma patients'
- Novalic, Z., 'Cytolytic virus activation therapy for Epstein-Barr virus associated nasopharyngeal and gastric carcinoma'
- Pilzecker, B., 'The role of DNA damage tolerance in hematopoietic stem cells, cancer therapy, and somatic hypermutation'
- Pirpinia, K., 'Exploring the potential and feasibility of multi-objective deformable image registration for breast cancer treatment'
- Poel, D., 'The predictive value of microRNAs for treatment benefit in advanced colorectal and head and neck cancer'
- Postema, A.W., 'Advanced ultrasound in prostate cancer care - diagnostic and therapeutic possibilities'
- Postema, F.A.M., 'Screening for tumor predisposition syndromes in childhood cancer'
- Rijken, J.A., 'SDHB-linked paraganglioma'
- Roessel, S. van, 'Clinicopathological outcome and prognostication in pancreatic surgery'
- Rond, L. de, 'Gently down the stream: Detection of extracellular vesicles by flow cytometry'
- Roodbeen, S.X., 'Transanal total mesorectal excision for rectal cancer: assessment of oncological safety'
- Schetters, S.T.T., 'Orchestrating the immune system to initiate adaptive anti-tumor immunity'
- Slev, V.N., 'Nurses' self-management support for people facing incurable cancer'
- Slot, M., 'Meningioma surgery: How far do we go and how far should we go'
- Steins, A., 'The role of the tumor microenvironment in tumors of the upper gastrointestinal tract'
- Straub, D., 'Using the mouse to study Barrett's Esophagus: We ain't that different after all'
- Strijker, M., 'The Dutch Pancreatic Cancer Project: Tools for a tailored approach to pancreatic and periampullary cancer treatment'
- Swaan, A., 'The analysis of prostate tissue by optical coherence tomography'
- Tio, D.C.K.S., Lentigo maligna, clinical management and histopathological diagnosis'
- Treffers, L.W., 'Modulation of antibody-dependent cancer cell destruction by neutrophils'
- Verburg, N., 'Advanced imaging in glioma treatment'
- Visser, M., 'Accurate quantification of glioma on MRI'
- Vrie, R. van de, 'Treatment selection in advanced ovarian cancer'
- Weerdt, I. de, 'Unraveling immunity in chronic lymphocytic leukemia'
- Zeilstra, J., 'CD44 isoforms in intestinal cancer| identity and functions'
- Zhang, X., 'Probe pressure effects on multi-diameter single fiber reflectance spectroscopy measurements'
- Zondervan, P.J., 'New developments in diagnosis and treatment of small renal masses'

Grants 2020

PURSUING NEW INSIGHTS

Research is essential for discovering new ways to prevent and treat cancer. External financial resources are fundamental in supporting our research. Each year, professionals compete for funding from organizations such as the European Commission, the Dutch Research Council (NWO), the Dutch Cancer Society (KWF), or from our own Cancer Center Amsterdam Foundation. In 2020, many of our researchers were successful in obtaining external subsidies to support their innovative research.

RESEARCH FACILITATED BY THE DUTCH CANCER SOCIETY (KWF)

In 2020, we received € 5 million from the Dutch Cancer Society. This funding supports the following research projects.

- Dr. Petra Kok: Optimization of pancreatic cancer treatment using chemotherapy and hyperthermia (€ 622,711)
- Dr. Desirée van den Bongard: One-time radiotherapy for breast cancer: high precision partial breast radiotherapy prior to breast conserving surgery (ABLATIVE-2 study) (€ 601,114)
- Dr. Angela de Boer: Individual placement and support for unemployed and work disabled cancer survivors (€ 637,389)
- Dr. Irma van Dijk: Reduction of organ motion during radiotherapy by non-invasive mechanical ventilation supported breathing control (€ 574,758)
- Dr. Adriaan Bins: eCRIMI: a safety and quality of life study of chemoradiotherapy, in combination with immunotherapy in patients with localized bladder cancer (€ 480,958)
- Prof. Tuna Mutis: Targeting Acute Myeloid Leukemia Stem Cells with Dual (split) Chimeric Antigen Receptor (CAR)-engineered T-cells (€ 670,563)
- Dr. Linda Douw: GOALS2: Glioblastoma brOAdband power as Longitudinal biomarker for tumor progreSsion (€ 506,645)
- Dr. Niels Heemskerk: Young investigator grant: Targeting tumor vessels to improve leukocyte trafficking for immunotherapy (€ 539,594)
- Dr. Judy van Beijnum: Unique high-risk project: iCARe – Chimeric antigen receptor T cells for targeting solid tumors through the vasculature (€ 166,664)
- Prof. Martin Klein (co-applicant): IDH-mutated astrocytoma after resection: continue treatment immediately or wait and see? IWOT – a phase III study (€ 536,088)

RESEARCH FACILITATED BY THE EUROPEAN COMMISSION HORIZON 2020

- Dr. Hans Crezee: HYPERBOOST: Hyperthermia boosting the effect of Radiotherapy (€ 3,761,881)
- Dr. Elisa Giovannetti: Project ALISE (Antibody Light-Induced Selectivity Enhancement) Anti-Cancer Light-Controllable Antibody-Peptide Conjugates (€ 745,000)
- Prof. Marie Jose Kersten: Monitoring multidimensional aspects of QUAlity of Life after cancer ImmunoTherapy - an Open smart digital Platform for personalized prevention and patient management (€ 356,557)
- Prof. Marie Jose Kersten: T2EVOLVE, "Time to Evolve" (€ 501,250)

Dr. Przemek Krawczyk (left), Dr. Hans Crezee (middle) and Dr. Petra Kok (right) *Photo by Mark Horn*

TURNING UP THE HEAT ON TUMORS

Dr. Hans Crezee, a physicist and principal investigator in the Radiotherapy Department of Amsterdam UMC, secured funding of € 3.7 million for a Horizon2020 Innovative Training Network project called HYPERBOOST. He is leading a collaboration involving eleven hospitals, technical universities, and companies in Europe to substantiate and increase the effectiveness of hyperthermia treatment combined with radiotherapy for the treatment of cancer.

Research and clinical evidence have shown that warming tumors in the body to just over 40 degrees Celsius can damage and even kill cancer cells, while sparing healthy surrounding tissue. Heat therapy, also known as hyperthermia treatment, via electromagnetic waves that are precisely aimed at the tumor is usually combined with other therapies against cancer. Hyperthermia treatment is not yet widely used for standard clinical care and is mostly embedded in clinical trials.

The project aims to generate knowledge and tools that will open the door to more wide-spread use of hyperthermia in clinical cancer centers in support of advancing personalized medicine and improving therapies for cancer patients in the future.

RESEARCH FACILITATED BY THE DUTCH RESEARCH COUNCIL (NWO)

Dr. Ir. Jan Van den Bossche: The regulation and function of a newfound immunometabolite in macrophages (€ 350,000)

RESEARCH FACILITATED BY THE ZORGINSTITUUT NEDERLAND (THE DUTCH NATIONAL HEALTH CARE INSTITUTE) AND ZONMW (THE NETHERLANDS ORGANIZATION FOR HEALTH RESEARCH AND DEVELOPMENT)

- Prof. Marie Jose Kersten (with UMC Groningen, Radboud UMC, and Erasmus MC): In-house CAR-T Production (€ 30,000,000)
- Dr. Veerle Coupé (with Radboud UMC): Towards patient-led follow-up after curative treatment of stage II and III CRC (€ 903,000)
- Dr. Roeline Pasman in collaboration with the Palliative Care Center of Expertise: Palliative care. More than care (€ 1,600,000)

AMSTERDAM UMC TKI-PUBLIC PRIVATE PARTNERSHIP GRANTS

The Amsterdam UMC TKI grants for Public-Private Partnerships seeks to stimulate research collaborations between Amsterdam UMC researchers and commercial companies. The funding is provided by the Dutch government (Ministry of Economic Affairs) through the Rijksdienst voor Ondernemend Nederland (RVO) and the Topconsortium voor Kennis and Innovatie Life Sciences & Health (TKI-LSH, a.k.a. Health-Holland).

- Dr. Joke M.M. den Haan: CanNanoVac: Novel nanovaccines to stimulate anti-cancer immunity (€ 342,020)
- Prof. Marie José Kersten: RACE-CAR: impRove endurAnce, priCe and Efficacy of CAR T-cells ('Faster, better AND cheaper CARs!') (€ 750,000)
- Dr. Michiel Pegtel: AQrate: A quantitative and qualitative assessment of EV-miRNAs for signature discovery in liquid biopsies (€ 750,000)
- Prof. Carlie J.M. de Vries: NR4Ants: NR4A antagonists as targeted strategy to boost cancer immunotherapy (€ 373,408)
- Prof. Philip de Witt Hamer: PPP Brain Tumors: Picturing Predictions for Patients with Brain Tumors (€ 711,000)

HANARTH FONDS: SUBSIDIES FOR ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

The Hanarth Fonds, established in 2018, aims to promote and improve the use of Artificial Intelligence and machine learning to improve the diagnosis, treatment, and outcome of cancer patients. Hanarth Fonds is made possible by the legacy of Arthur del Prado, founder of ASM International and considered to be the father of the European semiconductor industry.

- Prof. Ronald Boellaard: Artificial intelligence and machine learning for FDG PET / CT response prediction in diffuse large B cell lymphoma (€ 400,000)
- Dr. Pim de Graaf: MRI-based deep learning segmentation and quantitative radiomics in retinoblastoma: a next step towards personalized interventions (€ 400,000)
- Dr. Martijn van Oijen (with Radboud UMC): CUP fight: detecting the origin of metastatic disease (€ 400,000)

OTHER EXTERNAL SUBSIDIES

Prof. Arnon Kater: Correction of metabolic dysfunction in CAR-T cells as curative treatment option for small lymphocytic lymphoma/ chronic lymphocytic leukemia (€ 850,000) Funding: Lymph&Co.

Dr. Joke M.M. den Haan (with Yvette van Kooyk): Virus-like liposomes targeting CD169+ dendritic cells as a novel carrier for cancer immunotherapy (€ 94,000) Funding: Phospholipid Research Center.

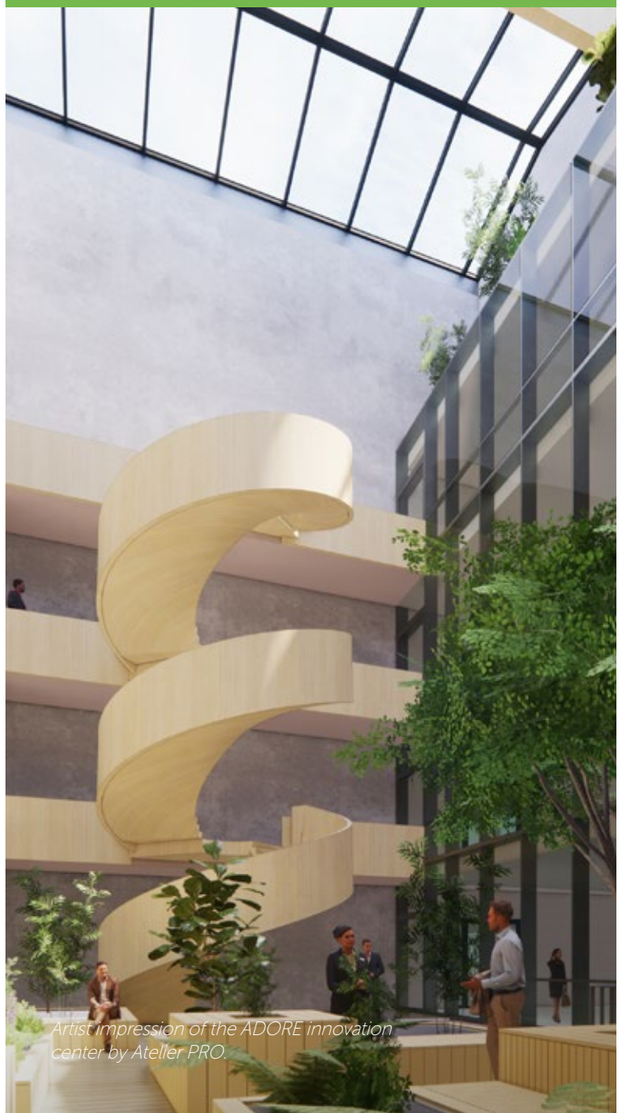
Prof. Rene Leemans: SONImage study (€ 638,000) Funding: Pfizer.

Dr. Marcel Spaargaren (with Steven Pals and Marie José Kersten): Towards a rational targeted therapy for Waldenstrom's Macroglobulinemia by kinome-centered loss-of-adhesion and synthetic lethality screens (€ 400,000) Funding: International Waldenstrom's Macroglobulinemia Foundation and Leukemia & Lymphoma Society.

Dr. Wouter Ouwerkerk (Dermatology, Amsterdam UMC) was part of a national team that obtained a Team Science Award of the Melanoma Research Alliance for setting up a worldwide consortium for collaborative research on germline biomarkers of melanoma immunotherapy (€ 900,000).

'OPPORTUNITIES FOR WEST': € 2.5 MILLION GRANT FOR CANCER AND NEUROSCIENCE RESEARCH

In an innovation center to be built at Amsterdam UMC on the Zuidas, called ADORE, cancer researchers will collaborate with neuroscientists on new treatments against cancer and brain diseases. 'Opportunities for West', a partnership of the four Randstad provinces and the four major cities, is granting this collaboration model a subsidy of nearly € 2.5 million.



Artist impression of the ADORE innovation center by Atelier PRO.

FUNDING TO KICK-START INNOVATIVE, PROMISING CANCER RESEARCH AT AMSTERDAM UMC

Every year, the Cancer Center Amsterdam Foundation provides funding to kick-start innovative cancer research at Amsterdam UMC. This internal 'seed-funding' is essential to pursue promising scientific leads in early-stage research projects. Cancer Center Amsterdam Foundation also makes strategic multi-year investments to propel promising research.

STRATEGIC INVESTMENTS TO PROPEL PROMISING RESEARCH

Cancer Center Amsterdam Foundation (Stichting Cancer Center Amsterdam) recently pledged extra support for four projects within Amsterdam UMC, Cancer Center Amsterdam, worth more than € 1.7 million.

- Cancer Center Amsterdam is joining forces with Antoni van Leeuwenhoek hospital and the Hartwig Medical Foundation to pool cancer patient information, including full genome sequencing data, to create a rich dataset for analysis by Artificial Intelligence.
- Whole-genome sequencing in patients with locally advanced (pancreatic) and metastatic solid tumors to identify molecular targets for (neo-)adjuvant and palliative systemic treatment.
- The purchase of a da Vinci Xi surgical robot will support operations in the abdomen and chest cavity.
- The initiative 'Hestia – Impulse for Refugees in Science' allows academics who have had to flee their homeland to continue their scientific careers in the Netherlands.

INNOVATIVE RESEARCH PROJECTS FUNDED BY CANCER CENTER AMSTERDAM FOUNDATION

- Dr. Anton Engelsman: A Phase I/II Proof-of-Concept Study of Somatostatin Receptor Type-2 Targeted Fluorescence Guided Surgery of Gastroenteropancreatic Neuroendocrine Neoplasms
- Dr. Costa Bachas: Computational approaches for predicting outcome parameters in myeloid neoplasms from clinical flow cytometry stem cell data
- Dr. Daniël Miedema: Chromosomal instability as key regulator of the immune microenvironment of cancers'
- Dr. Daniela Oprea-Lager: Dynamic [18F] FES PET imaging in patients with metastatic ER+ breast cancer
- Dr. Daoud Sie: In depth characterization of leukemia minimal residual disease using single cell transcriptomic analysis combined with quantitative cell surface protein profiling
- Dr. Joep Grootjans: Mapping the human peritoneal immune system to identify novel immunomodulatory targets for the treatment of peritoneal metastasized cancer
- Prof. Josée Zijlstra: Targeting and imaging glutamine metabolism in Chronic Lymphocytic Leukemia
- Dr. Lotte de Winde: Development of an in vitro human B-cell lymphoma model to study cancer dissemination
- Dr. Marieke Fransen: Immune-modulating effects of various doses of (chemo) radiotherapy and immunotherapy on tumor draining lymph nodes in stage II-III NSCLC patients
- Dr. Marike van der Leeden: OPRAH-pro study: Self-monitoring and advice on protein intake, integrated into an accelerometer-based physical activity intervention, to improve functional recovery in patients with cancer undergoing gastrointestinal or lung surgery
- Dr. Oliver Gurney-Champion: Respiratory mOtion-compensaTed Abdominal Tumour Imaging at high-resolutiON (ROTATION): Quantitative biomarkers and anatomical imaging
- Prof. Renske Steenbergen: Ovarian cancer detection by (epi)genetic biomarker analysis in urine
- Dr. Rubina Baglio: Liquid biopsy-based immune profiling for cancer patients' personalized medicine
- Dr. Pim de Graaf: Platform development for Artificial Intelligence-guided Radiomics and Image-based therapy in Head and Neck Cancer

SIX RESEARCHERS RECEIVE CANCER CENTER AMSTERDAM TRAVEL GRANTS

The travel grant awarded by Cancer Center Amsterdam Foundation allows PhD students and postdoctoral researchers to receive training in novel techniques or methods abroad.

- Charlotte Heidsma, pancreatic neuroendocrine tumors
- Fleur Cornelissen, glioblastomas
- Marion Chomet, radiolabeling of nanobodies
- Megan Engels: Artificial intelligence in detection and diagnosis of (pre-) malignant pancreatic lesions
- Sabrin Tahri, multiple myeloma
- Sander Bach, liquid biopsies

VENI, VIDI, VICI GRANTS...I CAME, I SAW, I CONQUERED

The Dutch Research Council (NWO) provides subsidies for talented researchers pursuing innovative research. The Veni grant gives creative new PhD graduates the opportunity to further elaborate their unique research ideas for a period of three years. Vidi grants enable exceptional scientists who have conducted research for a few years after their doctorate the chance to set up their own research groups. The Vici grant is for outstanding senior researchers with proven track records.

VENI TO FELIPE VIEIRA BRAGA FOR COLORECTAL CANCER RESEARCH

Dr. Felipe Vieira Braga received a € 250,000 Veni grant for his research project 'Good cop, bad cop: the role of regulatory T-cells in colorectal cancer development and treatment'

Dr. Braga: "The moment cancer cells move into a new neighborhood (metastasis), things start to go wrong. Neighbors usually contact the police (immune cells) to get rid of the cancer cells. I will study how immune cells evict cancer cells from their neighborhood."

VIDI TO ALAN GERBER FOR RESEARCH ON BRAIN CANCER

The € 800,000 VIDI grant enables Dr. Alan Gerber to perform research on tRNA regulation in tumors, with a focus on brain cancer. tRNAs are small molecules essential for protein synthesis. Understanding how cancer cells use these molecules to grow will help develop novel therapies against cancers. Dr. Gerber is a member of the Department of Neurosurgery with a co-affiliation at the Department of Clinical Genetics, and within the Neuro-Oncology Research Lab of Cancer Center Amsterdam.

Education in oncology at the beginning of 2020, before the COVID-19 pandemic

AWARDS 2020

Dr. Maria Themeli: 1st Emerging Investigators Joint Fellowship Award in the Field of Cell Therapy and Immunotherapy (€30,000) at the 3rd edition of the European CAR T-cell Meeting.

Dr. Rieneke van de Veno: NanoString Tumor Signaling Grant Award Winner 'The tumor microenvironment according to GARP'.

Dr. Linda Smit: Single Cell Epigenomics Scientific Challenge sponsored by 10x Genomics in partnership with Active Motif 'Identification of epigenetic factors playing a role in development of leukemia relapse'.

Prof. Marie Jose Kersten: award for best PhD supervisor of 2020 from the Graduate School AMC.

CANCER CENTER AMSTERDAM ANNUAL RETREAT

On March 5-6, many professionals from Cancer Center Amsterdam participated in the annual retreat at Noordwijkerhout. There was a principal investigators' meeting about the strategic vision of Cancer Center Amsterdam and a separate program for PhD students, postdocs, research technicians, research nurses, and undergraduate students. And, of course, the yearly party!

Awards for best publication, thesis and clinical impact were handed out at the retreat.

Clinical impact award 2019: Prof. Arnon Kater - Venetoclax phase 3 study.

Thesis award 2019: Dr. Gem Kramer - Validation of Imaging Biomarkers for Response Evaluation in Lung and Prostate Cancer.

Publication award 2019: Charlotte Stroes - Phase II Feasibility and Biomarker Study of Neoadjuvant Trastuzumab and Pertuzumab with Chemoradiotherapy for Resectable Human Epidermal Growth Factor Receptor 2–Positive Esophageal Adenocarcinoma: TRAP Study' in the Journal of Clinical Oncology.

NEWS IN BRIEF

SPECIAL DONATIONS FOR THE DEVELOPMENT OF A PREDICTIVE BLOOD TEST FOR PATIENTS WITH LYMPHOMA

Dr. Martine Chamuleau, an internist-hematologist with expertise in non-Hodgkin lymphoma, has received a very large donation from Cancer Center Amsterdam Foundation to develop blood analytics for patients with diffuse large B-cell lymphoma. Standard treatment only helps 60% of patients and it is currently not possible to predict how patients will respond to the treatment. The test will track the response of tumors to immune-chemotherapy by following changes in tumor markers present in the blood. When combined with patient outcome, predictive indicators (biomarkers) can be identified. "This donation gives us a unique opportunity to develop new effective therapies for this group of patients more quickly. We are extremely grateful to the donor," says Dr. Chamuleau.

WORLD CANCER DAY

World Cancer Day (February 4) commemorates the impact of cancer on the lives of patients and their loved ones worldwide. Many organizations including Amsterdam UMC turned their logo or photo upside down on social media to call attention to the event. At the VUmc location, cancer patients in the hospital received a special dish 'Zoethoentje' (chicken with dried dates and cheese). At the AMC location, a soup and a variety of flavor packages was offered to patients. Linda Schreefel, a chef at SmaakLAB (restaurant EKZ), gave advice to patients experiencing changes in taste due to cancer treatment on how adjusting the flavor of the dish (adding sweet, sour, salt, bitter or unami) could make it more appealing for them.

NEW APP FOR HEALTHCARE PROVIDERS IN GASTROENTEROLOGICAL TUMORS

An app has been developed for healthcare providers containing regional care pathways for the various gastroenterological (GE) tumors. The app is an initiative of the GE Network Council Noord-Holland / Flevoland and the Citrienfonds program Regional Oncology Networks. The first care path that has been made available in the app is for pancreatic tumors, and was developed by project leader and researcher Myrte Gorris.

https://www.oncologienetwerken.nl/nieuws/artikel/app-regionale-zorgpaden-voor-gastro-enterologische-tumoren

DELTA PLAN PANCREATIC CANCER RECEIVED A DONATION FROM THE FRIENDS LOTTERY

The Pancreatic Cancer Delta Plan received a large donation of € 505,000 from the Friends Lottery during the Goed Geld Gala held in February 2020. The Delta Plan is an initiative of the Maag Liver Darm Foundation, Living with Hope Foundation and the Dutch Pancreatic Cancer Group. With groundbreaking clinical scientific research, the Delta Plan aims to improve the still poor prognosis for patients with pancreatic cancer. The Delta Plan will accelerate scientific research by joining forces to make the best treatment available to everyone and work towards a better quality of life for patients.

Amsterdam UMC Imaging Center: Building of the Year

The Amsterdam UMC Imaging Center, completed in 2019 and designed by the architecture firm Wiegerinck, won the Architectenweb Care Building of the Year Award 2020. Its pioneering design was praised for bringing clinical care, research, and drug development together under one roof for the first time. Its flexible design is intended to be adaptable to rapidly evolving imaging research equipment, as well as promote communication and collaboration.

Courtesy Wiegerinck architecten

photo by William Moore

PUBLIC MEDIA SPOTLIGHT

In the COVID-19 pandemic, public media greatly increased their coverage of medical professionals and research in biomedical sciences. While SARS-Cov-2 dominated the news, our dedication to provide the best available care for cancer patients, expert knowledge, and breakthroughs were highlighted by various news outlets.

WHAT HAPPENS WHEN YOU HAVE TO PUT YOUR LIFE IN THE HANDS OF A DOCTOR?

'My Life in Their Hands', a program aired on Dutch television channel SBS6 in 2020, tells the story of seven people on their way to and after major surgery in the Netherlands. For some, the procedure was a matter of life or death. One episode followed Lotte, who was diagnosed with advanced colon cancer at age 28. As the title of the TV program suggests, Lotte's life was in the hands of oncology surgeons Babs Zonderhuis, Dr. Miranda Kusters and Dr. Martijn Meijerink during her two surgeries: the first on her liver and the second on her intestines.

Lotte reflected on her decision to participate in the TV program: "I mainly did it to let people know that young people can also get colon cancer, because that is weird and rare. If telling my story helped just one person to be diagnosed earlier, then I made a difference."

Babs Zonderhuis also had to think "quite a while" about participating in the program. "As doctors, we don't usually seek publicity. In this time of COVID-19, it is different of course, healthcare is much more in the media. That is positive, because there are staff shortages and working in healthcare is great, we feel. I wanted to show the impact of a surgical procedure and what the entire process was like for a patient. That is also the intent of the TV program. See, I operate every week and will do so for the rest of my working life. But a patient usually experiences something like this [a major operation] only once in their life (and Lotte twice). One never forgets the experience. You can also see that I build a bond with people, in this case Lotte. I also follow patients for a few years after the operation. I think showing all these aspects matters. I participated to show that we really care about our patients."

Babs Zonderhuis continues: "The viewer will see that having a major operation is intense, and has an enormous impact on your life, both physically and psychologically. Everything is shown fairly in the program, even when things are not going well, and people have complications. But viewers will also see that everyone in the hospital is there for you with the best intentions. That you get a warm and caring team that guides you and supports you."

Lotte felt Amsterdam UMC and Babs Zonderhuis were good for her in that regard. "Even though I knew it was going to be tough, I felt I was in the right place and with the right people. That gave me such peace of mind. I hope others who are very afraid or reluctant to have surgery will watch to see how it goes. I don't know if it applies to everyone, but the whole process felt very personal and caring to me; I was not a number."

https://www.kijk.nl/programmas/mijn-leven-in-hun-handen/23QBb8FxGgl

Adapted from: 'Wat gebeurt er als je je leven in de handen van een arts moet leggen', Erik Jonk, Metronieuws.nl.

At a glance

STATE-OF-THE-ART TREATMENT

- Expert knowledge about cancer
- Complex patient care by highly skilled medical professionals
- Participation in experimental treatments
- Full-spectrum supportive care, such as psychological help, physiotherapy, diet and lifestyle guidance

GROUNDBREAKING RESEARCH INITIATIVES

- 4 Horizon2020 grants
- 1 Veni grant
- 1 Vidi grant
- 4 NWO/ZonMw subsidies
- 10 Dutch Cancer Society projects
- 5 Amsterdam UMC TKI grants for public-private partnerships
- 3 Hanarth Fonds grants
- 6 Travel grants

RESEARCHERS

- Over 1350 researchers
- 150 professors
- 550 PhD students

UNIQUE FACILITIES

- Amsterdam Skills Centre
- Da Vinci XI surgical robots
- Imaging Center
- Varian Ethos linear accelerators
- CRISPR Expertise Center
- Functional Genomics Screening Center
- Genomics Core Facility
- Liquid Biopsy Center
- Metabolomics Core Facility
- Microscopy and Cytometry Core Facility
- OncoProteomics Facility

TRANSFER OF KNOWLEDGE AND SKILLS TO (FUTURE) PROFESSIONALS

- 1037 scientific publications
- 95 PhD graduate theses
- Oncology Graduate School Amsterdam
  - 16 educational activities
  - 580 participating PhD students
  - Oncology Basic Knowledge Course for PhD students and clinical fellows
- Annual retreat for all oncology physicians, researchers, technicians, research nurses
- (Inter)national lectures and seminars

photo by Claudia Kamergorodski

Colophon

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