Amsterdam UMC
University Medical Centers

Cancer Center Amsterdam

The power of collaboration

Annual Review 2019

A dream team for every patient

See more, predict better

Groundbreaking professionals

Contents

Image: Claudia Kamergorodski

2019 was characterized as a year full of major achievements for the Cancer Center Amsterdam. The common thread was success through collaboration. Only by working together can we make strides forward and ensure that every cancer patient will receive the best treatment, now and in the future.

Collaborations happen at many places in the Cancer Center Amsterdam: within treatment teams at various locations in the Amsterdam UMC, on a regional level between Amsterdam UMC and partner hospitals, and worldwide between researchers and physicians.

However great the diversity in collaborations, the objective is always the same: to provide the best possible care for patients. To achieve this, we strive together to push the boundaries, show courage, and also dare to be honest during the last phase of the disease - always in the best interest of the patient.

In order to fuel innovation and progress, state of the art facilities are essential. In 2019, two major centers were added to facilitate the groundbreaking work of our scientists and medical professionals. The Imaging Center offers cutting edge medical imaging to aid diagnosis, treatment, and drug development. The Amsterdam Skills Centre is a next generation learning platform where professionals of today and tomorrow can learn essential operating skills.

The theme of this annual review is 'collaboration'. Collaboration and success go hand in hand. We present our successes of 2019, including groundbreaking publications in high-impact scientific journals, numerous grants and distinguished prizes received by our professionals, fundraising efforts, and above all our personal commitment when caring for our patients. We would like to dedicate this publication to all employees, colleagues, and volunteers who work daily for patients with cancer. Together we make the impossible possible.

Prof. Dr. Jan Paul Medema
director of research institute
Cancer Center Amsterdam

Prof. Dr. Geert Kazemier
chairman of the executive board
Cancer Center Amsterdam

TEAMWORK MAKES OUR DREAM WORK

Working together on improving healthcare

Cancer is a complex disease that disregards disciplinary boundaries. Treating cancer requires an approach that goes beyond the existing frameworks of medical disciplines. Above all, it requires cooperation and collaboration between different professionals, institutes, regions and countries. Cancer care for the patients of today and tomorrow can only be improved when we work together: with commitment, ambition and persistence.

TOP QUALITY CARE FOR PATIENTS OF TODAY AND TOMORROW

We provide today's patients with the best possible care while striving to improve treatments for the patients of tomorrow. Our professionals are committed to this goal, each from their own discipline. Together with experts from other medical centers, we aim to ensure that every patient is cared for by a tailored multi-disciplinary team of medical professionals who are available regardless of the patient's care location or the hour of the day. In addition, international collaborations bring us closer to our goal of ensuring top quality care for patients with cancer today and in the future. Importantly, patients also play a crucial part: the patients that participate in research today help develop opportunities for the patients of tomorrow.

COLLABORATIONS WITHIN THE AMSTERDAM UMC

Embedded within an academic medical center, our professionals have state-of-the-art knowledge of a wide variety of disciplines and medical conditions. This assures that we can provide optimal care for patients with cancer who may also have other conditions requiring treatment. Often, patients do not only have cancer, but also diabetes or COPD, or they have suffered heart damage due to a previous heart attack. Therefore, we work with professionals from appropriate fields of expertise to learn from each other and determine the best possible care for our cancer patients. An example of this collaborative care is the ADORE (Amsterdam Oncology and Neuroscience Research) initiative. Beginning in 2019, a close collaboration between researchers from the fields of neuroscience and oncology was initiated in order to bolster both scientific advancement and cancer care. The interdisciplinary nature of ADORE is anticipated to greatly enhance opportunities for learning through shared knowledge and resources. To facilitate this promising collaboration, plans for a new research building housing both disciplines are underway.

REGIONAL COLLABORATIONS

The patients' choice of a care facility should never limit access to the latest knowledge and expertise. That is why we participate in the program 'Towards regional oncology networks' initiated by the Citrienfonds. In 2019, steps were taken to bring professionals from all regional hospitals closer together. Referral of patients should therefore be easier and the patient should perceive all the hospitals in the region as one. This is referred to as 'healthcare without walls'.

(INTER)NATIONAL COLLABORATION

International collaboration is also of great importance for achieving our goal. Numerous international collaborations enable translational and clinical research that would otherwise simply not be feasible. Translational research is the link between fundamental and clinical research where research insights are tested in healthcare practice. A good example of this is our COLOR III trial. In this trial, two surgical techniques for rectal cancer removal are being compared. Eight foreign hospitals are participating: six in China, one in Taiwan and one in Hong Kong. Surgeons are invited back and forth for conferences and hands-on training. This international collaboration is possible thanks to a secure online platform which was developed specifically for the study.

STATE-OF-THE-ART RESEARCH, EDUCATION, AND HEALTHCARE GO HAND IN HAND

New treatments must be developed, tested, and implemented. Healthcare, research, and education must therefore go hand in hand. While new techniques provide opportunities for improved treatments and new research prospects, healthcare providers must be able to implement these novel technologies. We support our staff by providing education in the newest techniques according to the latest developments. In this way, we help established professionals expand their knowledge, and also educate the professionals of the future.

NEW STATE-OF-THE-ART FACILITIES

As a large and ambitious academic medical center, we have state-of-the-art facilities in addition to unique expertise. Our facilities include everything necessary to support innovative research and to provide the best possible care for cancer patients. Two important new centers opened their doors in 2019: the Imaging Center, with ultra-modern imaging technology, and the Amsterdam Skills Centre, where professionals can learn the latest surgical skills.

EVERY ROLE IS IMPORTANT

All roles within a team are important, even ones that are less visible. For example, all disciplines in oncological care benefit from the very latest technological knowledge and expertise of statisticians, data scientists, and IT infrastructure specialists. Collaborations among professionals with distinct expertise enables a problem-solving approach from different angles. The efforts of technicians and biobank staff ensure that tissue samples from patients are catalogued properly. Offering cutting-edge care would not be possible without the knowledge and skills of nurses. Nurses support cancer patients at critical moments. Whatever role a professional on the team fulfills, there is one thing that unites them: commitment to the patient.

Towards Regional Oncology Networks

A dream team for every patient

The latest knowledge and top-quality healthcare must be available to every patient, regardless of location or practitioner. To achieve this, we work together with other hospitals in the region as part of the program, 'Towards Regional Oncology Networks', funded by a health initiative known as Citrienfonds. Since 2014, the Citrienfonds has been committed to improving the quality of care while maintaining accessibility and affordability of healthcare in the future, thereby promoting sustainable healthcare. Within our region, one of the ways we support this project is by organizing online expert panels. Stijn van Roessel was the project leader when the online expert panels first started. He discusses how this project creates a 'dream team for every patient', regardless of their location or healthcare provider.

> Regional collaborations facilitate the availability of acquired knowledge to everyone.
>
> – Stijn van Roessel, project leader Regional Oncology Networks.

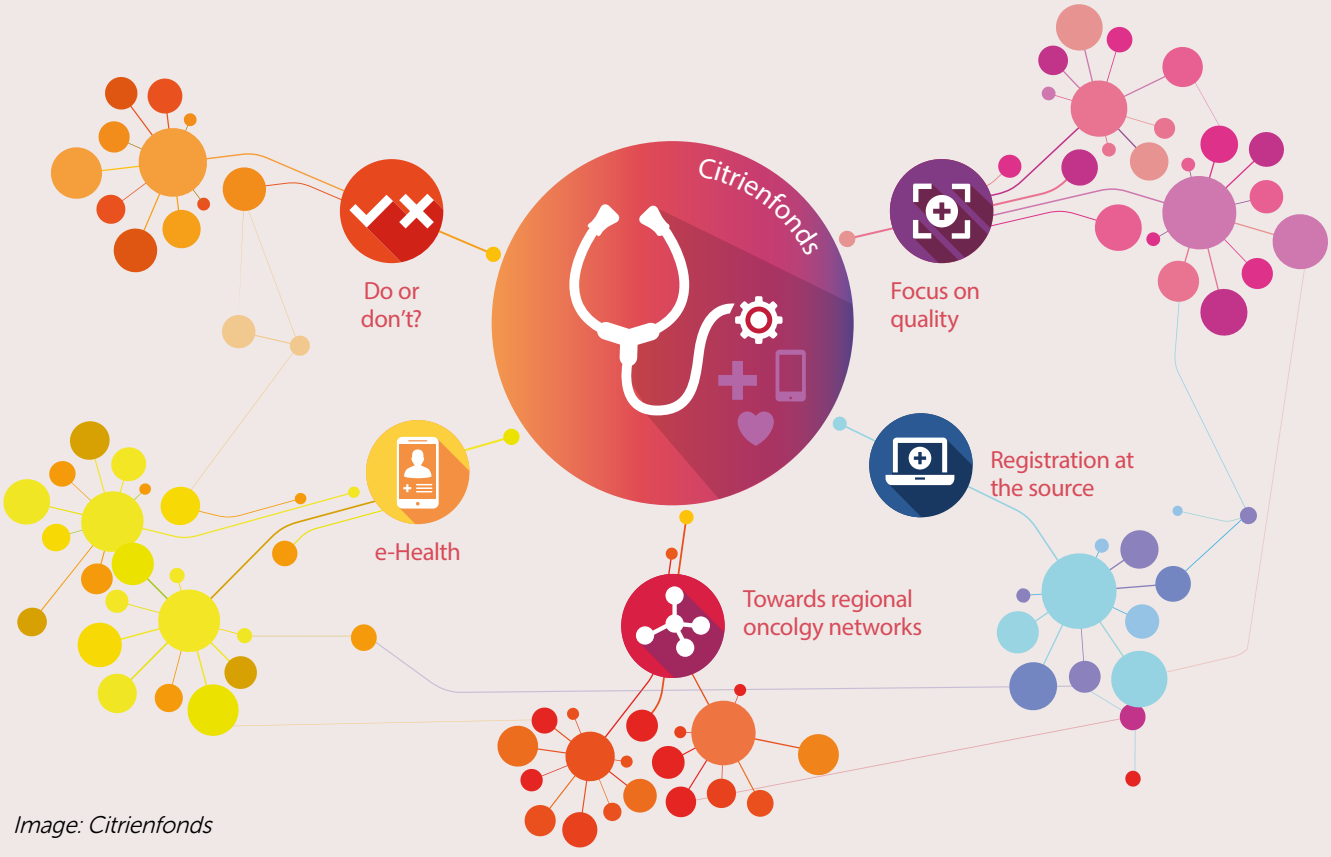


Image: Citrienfonds

BREAKING DOWN 'THE SILO MENTALITY'

Under the supervision of Marc Besselink, a surgeon at Amsterdam UMC, Stijn van Roessel was involved in the theme of a 'Tailored Treatment Plan'. Van Roessel: "I have seen the oncology landscape change for the better in the period of 2017-2020. At the beginning of that period, the different hospitals mostly still thought from their own silos. Now, there is more ambition and more oncology care that takes place in a network chain. I myself have participated in the online expert panels for pancreatic cancer care and the digital exchange with and without the use of XDS." XDS stands for Cross-enterprise Document Sharing, an international standard for digital data exchange. "In 2019, my focus was mainly on the regional care paths for gastrointestinal tumors within the North Holland / Flevoland region." Van Roessel was also closely involved in setting up the GE Oncology Network Council. This initiative originated within the Regional Oncology Networks project and consists of a collaboration between gastroenterological (GE) specialists.

> "The treatment of cancer patients requires a lot of coordination."
>
> – Stijn van Roessel, project leader Regional Oncology Networks.

COMMUNICATION IS CRUCIAL

Van Roessel is enthusiastic about the benefits of the program. "Regional collaborations facilitate the availability of acquired knowledge to everyone. Only through effective networking can we achieve the motto of the program: 'Care close by if possible, further away if necessary'."

In 2020, Van Roessel's involvement in the program will come to an end. What advice does he have for his successors? "Keep an open mind and bring people together. The lack or failure of regional collaboration is often due to making wrong assumptions. Coordination can also be streamlined, with digital exchange playing an undeniably important role."

Communication is extremely important, he says. "With the patient, between hospitals, but also between colleagues. The treatment of patients with cancer requires a lot of coordination. It is also important that healthcare professionals find each other quickly and easily. Stakeholders must be actively involved in the projects. Fortunately, there is a lot of intrinsic motivation from the care staff to improve care and cooperation within oncology."

More information is available on the program website oncologienetwerken.nl

Text: Joke van Diemen-Markx

Regional Network meetings are a big success

Meanwhile, the Regional Oncology Network program is gaining momentum. The initial network meetings for specialists dealing with cancer of the stomach, intestine, pancreas, and liver were a great success. At these meetings, more than 25 medical specialists from over 10 hospitals within the North Holland / Flevoland region discussed how they could better streamline the care for their patients.

Such meetings are now regularly organized to further develop other care pathways, and a meeting for case managers and oncology program managers from the region is also planned.

View the upcoming events on the website of the Regional Oncology Network program: oncologienetwerken.nl/agenda

New technologies, new opportunities

Novel technologies are being developed at lightning speed and continuously provide new opportunities. But which innovations will really provide benefits to our patients? An overview.

ARTIFICIAL INTELLIGENCE AND BIG DATA

Big Data (analysis of huge datasets) is utilized in both healthcare and research. Collaboration also plays an important role here, as we team up with the data specialists from SAS.

CRISPR TECHNOLOGY

The CRISPR technique enables us to make precise changes to the DNA. For example, treatment-resistant cancer cells can be made susceptible to immunotherapy. In order to take full advantage of possible applications of this new technique, we have recruited an expert in the field of CRISPR. With the launch of an online platform with current relevant information involving CRISPR, professionals can ask questions and get help setting up studies. This has already proven successful: several grants utilizing the CRISPR technology have recently been awarded. In addition, courses and seminars have been developed to provide information and education about CRISPR applications.

More information is available on crispr-platform.nl

DIAGNOSIS VIA BODY FLUIDS

Diagnosis via body fluids such as blood or urine (liquid biopsy) is much less invasive and painful than, for example, taking a biopsy with a needle. In addition, it is expected that rapid advances in liquid biopsy technology will allow earlier and more accurate diagnosis compared to traditional methods. Our Liquid Biopsy Center, set up with funding from the Cancer Center Amsterdam Foundation, is a 'biobank' where body fluids are stored deep frozen for use in research.

Image: RVD

Queen Maxima during an official visit at the Imaging Center

ENHANCED IMAGING TO IMPROVE OUTCOMES

Making the invisible visible

Imaging is an indispensable tool for diagnosing, investigating, predicting, and treating cancer. Innovations in the field of imaging provide (future) patients and researchers with new opportunities, such as a faster diagnosis or an improved assessment to determine which treatment is most effective.

DIAGNOSE, INVESTIGATE, PREDICT, AND TREAT

The opening of the Imaging Center, where ultra-modern imaging facilities are gathered together under one roof, is a huge leap forward for patients, practitioners, and researchers. Guus van Dongen, professor of Medical Imaging and founder of the Imaging Center, explains the opportunities that imaging offers for the treatment of patients with cancer in 'Opening of the Imaging Center'.

Researcher Bert Windhorst received a large European grant to investigate the effectiveness of immunotherapy. With the development of 'tracing substances', it can be determined whether immunotherapy is promising for a patient. Read about it in the article 'Innovative research on immunotherapy effectiveness'. This groundbreaking research would not have been possible without the Imaging Center. Imaging via data analysis and AI is the topic of the article '*Artificial Intelligence* for faster evaluation'.

Opening of the Imaging Center

No patient is the same. That is why it is so important to get an accurate picture of the course of the disease in an individual. Opened in 2019, the Imaging Center offers technical facilities that provide a good diagnostic picture, and brings together clinical care, research, and drug development under one roof. That means more benefits for both the patient and the researcher.

TREATMENT AND RESEARCH UNDER THE SAME ROOF

The Imaging Center, located in the Amsterdam Zuidas, is a unique and remarkable facility. It is the only place in the world where production, treatment, and research are brought together in one center. This is where the most advanced medical imaging techniques for healthcare and scientific research come together with the latest techniques in the field of diagnostics. "Being in one place allows us to diagnose faster and see which treatment is best," says Guus van Dongen, professor of Medical Imaging and founder of the center.

> "Above all, the Imaging Center is a place where we can treat patients in the best and fastest way in the most pleasant environment possible."
>
> - Guus van Dongen, professor of Medical Imaging.

MORE AFFORDABLE PLUS IMPROVED PATIENT CARE

Because the Imaging Center hosts both medical and pharmaceutical research, the costs of drug development can be reduced. Treatments become more targeted: the right treatment for the patient can be administered at the right time. In addition, the center has an important international role in drug development and cost control. "In the Imaging Center, we make the medical isotopes and tracers for other Dutch hospitals and foreign research centers in an environmentally friendly way," says Van Dongen. "But here too, patient care remains paramount," he continues. "Above all, the Imaging Center is a place where we can treat patients in the best and fastest way in the most pleasant environment possible."

Part of this text was derived from the article "Looking at what drugs are doing in patients" by Daniëla Cohen.

Imaging Center at the Zuidas, Amsterdam

- Medical imaging techniques for healthcare and scientific research.
- Diagnostics for patients with cancer, immune system disturbances, neurological or cardiovascular diseases.
- Manufacturing of medical isotopes and tracers for multiple hospitals.
- Clinical tests of new medicines from national and international pharmaceutical companies.

The center opened on October 31, 2019 with an official visit of Queen Maxima.

Watch an introductory video of the Imaging Center on our YouTube channel: tiny.cc/imagingcenter

Pioneer in medical imaging granted knighthood

Emeritus professor Jonas Castelijns has been instrumental in pioneering research in the field of head and neck radiology. Upon his retirement in 2019, after having been associated with Amsterdam UMC for 34 years, he was awarded Knight in the Order of the Netherlands Lion. He received this high distinction from Barbara de Reijke, deputy mayor of Ouder-Amstel. As early as the 1980s, Castelijns worked with MRI to detect and diagnose cancer. He was one of the pioneers of ultrasound-guided puncture for patients with head and neck cancer. Beginning in 2010, he applied MRI techniques to see how tissue functions and worked on MRI data supplemented with AI in his later research. In 2017, he received the 'Gold Medal Lifetime Achievement Award' from the European Society of Head and Neck Radiology for his groundbreaking research and many publications.

Innovative research on immunotherapy effectiveness

‘Looking’ in the patient with trace substances

Bert Windhorst, professor of Radiopharmaceutical Chemistry at Amsterdam UMC, received a European grant of 30 million euros to conduct research into the effectiveness of immunotherapy. He will conduct the research at the Imaging Center where it is possible to visualize immunotherapy dynamics using non-invasive and high-end imaging techniques.

DETERMINING THE IMPACT OF THERAPY EARLY ON

“We look into the patient to determine as early as possible whether the therapy the patient is receiving is promising,” says Bert Windhorst. He explains the research design of the Immune-Image project: “With tracing substances, also called tracers, we detect the activated immune cells that attack the tumor. After immunotherapy, we inject the tracer again and see whether the number of activated immune cells increased as a result of the treatment. If so, we expect the treatment to be effective with that patient.”

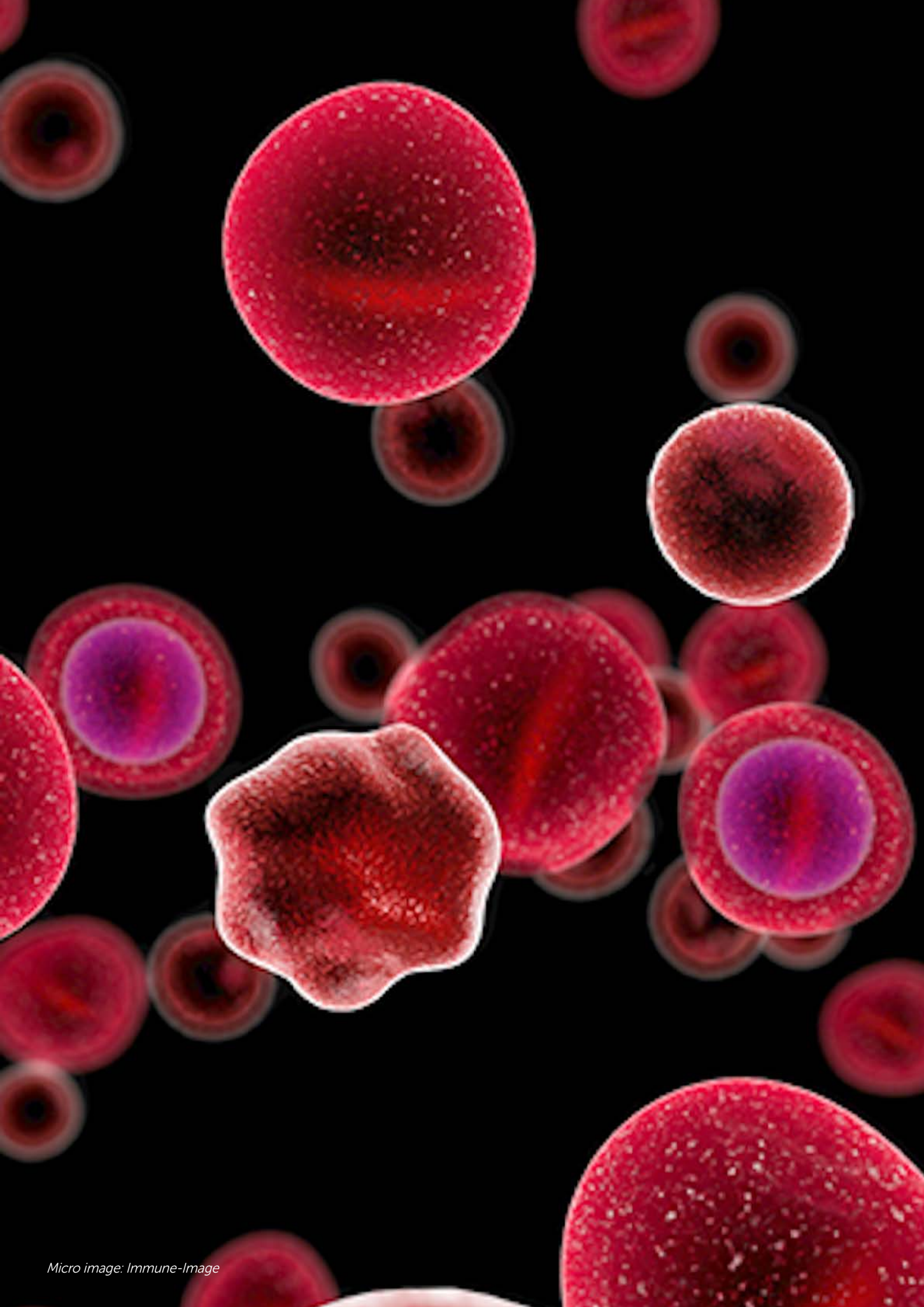
JOINING FORCES

The aim is to develop new imaging techniques, tracers, methods, and medicines in order to improve healthcare for all. The project was awarded a grant of 30 million euros from the Innovative Medicines Initiative (IMI), a joint technology initiative of the European Union (EU) and the European Federation of Pharmaceutical Industry and Associations (EFPIA). The endeavor, launched on October 1, 2019, brings together ten European top scientific institutions, seven pharmaceutical companies, four small- to medium-sized companies, and one patient organization. This type of cooperation characterizes our chosen course in the fight against cancer: progress can only be made by joining forces and expertise.

Read more about this project and the current state of affairs: immune-image.eu

‘Immune-Image’ directed by Bert Windhorst, professor of Radiopharmaceutical Chemistry at Amsterdam University Medical Center, in collaboration with F. Hoffmann-La Roche Ltd, Basel, Switzerland. Duration: 5 years. Research budget: 30 million euros, of which 15 million euros comes from pharmaceutical business partners (EFPIA), in the form of in-kind or cash contributions.

Bert Windhorst



Micro image: Immune-Image

Artificial Intelligence for faster evaluation

See more, predict better

DATA RELEVANT FOR CLINICAL DECISION MAKING

Is surgery useful for this patient or not? New technologies such as analysis of large data sets and 'Artificial Intelligence' (AI) can make evaluation of tumors better and faster. Since 2018, Amsterdam UMC has partnered with SAS (one of the world's largest data specialists) to explore utilizing advanced analytic technology in our fight against cancer. Oncology specialists have access to the technology to gain knowledge and experience of the opportunities offered by AI. Data sets that were previously too large, obscure, or time consuming to analyze can now be included in clinical decisions thanks to AI. This means that the chances of a therapy being successful can be better assessed.

In fact, the use of advanced data analysis can reveal information that was previously hidden. And the more we can see, the better we can predict. "We are now able to run the response evaluation fully automatically, which is good news. This means that the process is not only faster, but also more precise than when it is done by people," says surgeon Geert Kazemier.

ESTIMATE EFFECTIVENESS IN ADVANCE

Under the acronym CEASAR, a project was started with the aim of improving colorectal cancer care by predicting treatment outcomes using computer models. The project has been underway for three years and entered an important third phase in 2019. In the first phase, the SAS data specialists were asked to convert computerized tomography (CT) scans to 3D images in order to properly measure the volume of tumors. With that 3D image, it was possible to view the tumor properties such as blood flow, a good indicator of the prognosis, at the pixel level in the second phase. The third stage, which started in 2019, is to determine the exact location of the tumor in the liver. Ultimately, the relevant clinical data, in addition to CT scans, will be linked together to predict the effectiveness of chemotherapy treatments for each patient. The AI technique can also be applied to other solid tumors, such as breast and lung cancer.

> Research is essential to get a clear picture of both opportunities and risks.
>
> - professor Ronald Boellaard.

EXPERTISE ALONE IS NOT SUFFICIENT

Within the Amsterdam UMC, various professionals are exploring the possibilities of *AI*, such as professor Ronald Boellaard, head of the Imaging Methodology Group of the Department of Radiology and Nuclear Medicine. The application of AI on behalf of patients places new demands on knowledge and skills, he says. For example, knowledge about the proper application of AI is required. "What is possible, what is not possible, how much value do you attach to AI results?" But expertise alone is not enough. New requirements are also set for the infrastructure. "Scaling up AI often requires larger and more powerful systems. Clinical researchers need both AI expertise and IT research support and computing systems. We look at that."

> AI is going to help us save lives... I'm convinced of that.
>
> - Geert Kazemier, oncological surgeon.

BETTER TREATMENTS

The Hanarth foundation aims to improve the treatment and outcome of cancer patients by using Artificial Intelligence and machine learning. In 2019, the foundation awarded a grant to neurosurgeon Philip de Witt Hamer for research into the possibilities these techniques offer to improve neurosurgical decisions in patients with glioblastoma (a type of brain tumor).

GROUNDBREAKING PROFESSIONALS

Transfer of knowledge and skills as the key to innovation

Our oncology professionals are taught the latest insights in the field of cancer treatment and research. Knowledge sharing is essential for today's professionals. We give them the best opportunities to learn from and with each other. In this way, we ensure that the cancer patient receives the greatest benefit from all available knowledge. This innovative approach also ensures the continual improvement of oncological care and turns top professionals into groundbreaking professionals.

EDUCATION GAINS ANOTHER DIMENSION

Just having knowledge is not enough. Professionals must also master the right skills. The Amsterdam Skills Centre, which opened in 2019, adds an important dimension to our educational abilities: training skills. The Amsterdam Skills Centre utilizes the latest technologies so that surgeons, medical specialists and other medical personnel can master new techniques faster. In 'Opening of the Amsterdam Skills Centre', we explain more about the design of this unique high-tech center. Naturally, we also introduce our newly appointed professors and we spotlight the very first researcher who obtained a doctorate in the Diamond Program, which is funded by the Dutch Research Council (NWO).

> "If I have seen further, it is by standing upon the shoulders of giants."
>
> - Isaac Newton in a letter to Robert Hooke.

Opening of the Amsterdam Skills Centre

Training skills to a higher level

Both knowledge and skills are crucial for all medical professionals, including oncology. Both need to be learned and kept up to date. With the opening of the Amsterdam Skills Centre (ASC) in 2019, medical education has gained a unique center. This international training center for surgeons, medical specialists and other medical professionals aims to further improve the quality of care and to reduce training costs with the help of simulators, virtual reality and Artificial Intelligence. The ASC calls this 'a new way of learning' in which digital innovations play a central role.

SHORTER LEARNING PATH WITH DIGITAL TECHNOLOGY

On average, a surgeon requires 30,000 hours of training and practice before one is allowed to operate independently and lead a surgical team. That is, the ASC states, four times as much time as helicopter pilots need to obtain their wings. And even three times more than Jimi Hendrix needed to become 'the world's best guitar player'. By utilizing digital techniques such as simulators, virtual reality, and Artificial Intelligence, medical professionals are empowered to master required skills in a shorter timeframe, while simultaneously elevating the quality of care.

WHAT THE AMSTERDAM SKILLS CENTRE HAS TO OFFER:

- Smarter and faster learning
- Reducing healthcare costs
- Training 'off the job'; where it is okay to make mistakes

View the ASC website: www.asc.amsterdam

World leader in Life Sciences

The Amsterdam Skills Centre (ASC) opened in February 2019. The high-tech center includes twelve operating rooms, operating robots, and virtual reality simulators. This was achieved through collaboration with the international medical technology company Stryker. The project was the result of the merger of the boards of AMC and VUmc into Amsterdam UMC. The Municipality of Amsterdam supports the ASC as part of its ambition to strengthen the capital's position as a pioneer in the Life Sciences and Health industry.

Image: Valtos Architecten

Awards for groundbreaking research

We have world-leading specialists at our institute who push boundaries in different ways. The prestigious awards received by a number of our professionals in 2019 are evidence of the international recognition of their important work.

VENI-AWARD: MARIT ROEMER

The Veni grant is awarded by the National Research Council (NWO) to researchers who have recently graduated. The recipients are selected based on the quality of the researcher, the innovative character of the research, the anticipated scientific impact of the research proposal, and the possibilities for knowledge utilization. The grant has a maximum of 250,000 euros.

Research on immunotherapy against Hodgkin lymphoma

Marit Roemer received a Veni grant for her research proposal 'Mechanism of action in immunotherapy against Hodgkin's lymphoma'. Immunotherapy is a new, promising treatment that stimulates the body's own immune response against cancer cells. Encouraging results have been achieved in Hodgkin's lymphoma, a cancer of the lymphatic system, but little is known about how exactly this therapy works. Roemer will investigate this mechanism, which is crucial for identifying patients who would benefit from this treatment. She was one of nine talented and creative researchers at Cancer Center Amsterdam who were awarded a Veni grant in 2019.

VIDI-AWARD: LINDA DOUW

The Vidi grant, also from the NWO, is awarded to innovative researchers who have already conducted research at post-doctoral level for a number of years. Recipients receive up to 800,000 euros for the development of an innovative line of research. They can use the funds to appoint additional researchers.

Mapping the brain network

Linda Douw conducts her research within the Brain Tumor Center of the Cancer Center Amsterdam. Problems such as a reduced memory capacity and difficulties planning ahead can be additional burdens for patients with a brain tumor. However, these kinds of problems are difficult to predict and treat. Douw's mission is to map the brain network so that differences between people can be better understood, potentially leading to improved diagnosis and treatment plans. Her innovative research combines two branches of science: neurology (with the use of neuroscientific measuring instruments, such as MRI) and mathematics (the theory of multi-layered networks).

NWO TOP GRANT: JOKE DEN HAAN

The TOP grant is awarded by the Netherlands Organization for Health Research and Development (ZonMW). An amount of 675,000 euros is awarded annually to excellent research groups engaged in groundbreaking research with a major impact on society. The funds can also be applied to promote collaborations.

Towards a vaccine against cancer

Collaboration is an important criterion of the projects that receive a NWO TOP grant. In this research proposal, specific knowledge about the immune system available within the team of Joke den Haan of the Cancer Center Amsterdam is combined with the expertise of professor Gert Storm of Utrecht University on lipid vesicles. Purpose: to develop a vaccine against cancer that activates the cells of the immune system to recognize and destroy tumor cells. The researchers aim to use lipid vesicles to target specific immune cells that will activate the immune system better.

FIRST CCA CLINICAL IMPACT AWARD

New insights should not only lead to publications or dissertations, but above all to improvements in clinical practice. With this in mind, the Cancer Center Amsterdam Clinical Impact Award was first awarded in 2019 for research that directly benefits the patient. The first winner was Arnon Kater for his research 'Venetoclax phase 3 study'. This study details the prospects for long-term control of chronic lymphocytic leukemia without chemotherapy. It resulted in a treatment regimen that is now covered by Dutch health insurance and recognized by the U.S. Food and Drug Administration and the European Medicines Agency.

PUBLICATION AWARD 2019

The Publication Award is presented to the lead author of an excellent scientific report that originated in the Cancer Center Amsterdam. The winner of the 2019 Publication Award was Charlotte Stroes for the publication '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 (December 2019). The publication showed important new possibilities in combination therapy of esophageal cancer.

THESIS AWARD 2019

The most outstanding thesis at the Cancer Center Amsterdam also receives an annual prize: The Thesis Award. This prize was awarded in 2019 to Gem Kramers for his thesis entitled 'Validation of Imaging Biomarkers for Response Evaluation in Lung and Prostate Cancer'.
His thesis described how early use of certain biomarkers for imaging in lung and prostate cancer can improve the effectiveness of treatments. The information from the markers can also be used for the development of specific drugs. Kramer defended his thesis and was awarded the distinction cum laude. In addition, he has published his work in several important scientific journals.

Image: NWO Hollandse Hoogte/Studio Oostrom

NWO Spinoza prize

PROFESSOR OF MOLECULAR CELL BIOLOGY AND IMMUNOLOGY YVETTE VAN KOOYK

The NWO (Dutch Research Council) Spinoza Prize is the highest award in the Netherlands for excellent and groundbreaking research with international acclaim.

CREATIVITY AS A PATH TO NEW INVENTIONS

"Learning new things and making connections is what I do." Professor of Molecular Cell Biology and Immunology Yvette van Kooyk talks about her work in an interview on YouTube. "Creativity is an important tool", she explains. "Only by being creative can you make new discoveries. I wasn't looking for infectious diseases at all, but we did arrive there," she says. Van Kooyk unraveled the mechanism by which the immune system is disrupted during the development of cancer, autoimmune diseases, and infectious diseases such as AIDS. She discovered that certain sugar molecules called glycans can stimulate or actually inhibit communication between cells of the immune system. The nano-drugs she develops are intended to support the immune system in the fight against cancer and other diseases. Van Kooyk is regarded as a worldwide authority in this field.

Watch the entire interview with Yvette van Kooyk here: tiny.cc/VanKooykSpinoza

Consolidator Grant European Research Council (ERC)

PROFESSOR OF INTERNAL MEDICINE ARNON KATER

The Consolidator Grant is awarded by the European Research Council to outstanding scientists so they can further develop their own research programs in pursuit of groundbreaking discoveries.

RESEARCH INTO THERAPIES AGAINST CHRONIC LYMPHOCYTIC LEUKEMIA

Professor of Internal Medicine and Translational Hematology Arnon Kater, of Amsterdam UMC, received a Consolidator Grant from the European Research Council (ERC) in 2019. With this grant of 2 million euros, Kater will perform research into the application of immune cells to combat chronic lymphocytic leukemia (CLL). This disease is the most common form of leukemia in the Western world and to date there is no cure. Therefore, there is a great need for new treatments. Kater will focus on the utilization of the body's own T-cells, a type of immune cell, to fight the cancer.

Image: Claudia Kamergorodoski

Grants 2019

Facilitating the quest

Research can lead to new insights and better ways to prevent, detect, or treat cancer, including improving the quality of life for cancer patients. Financial resources are essential to support this research. In part, our research funding comes from the government, but we are also very dependent on other sources. This support is usually acquired though highly competitive funding rounds from organizations such as the European Commission, the Dutch Research Council (NWO), the Dutch Cancer Society, or from our own Cancer Center Amsterdam Foundation. In 2019, many of our researchers successfully competed for funding to support their research projects.

CCA GRANTS FOR PROMISING RESEARCH

Researchers involved in cancer research at Amsterdam UMC can apply for internal 'CCA Grants' for innovative and promising research that may be at an early stage or is otherwise not yet ready for submission to established funding agencies. These grants are made possible by the Cancer Center Amsterdam Foundation. An important criterion in evaluating the project proposals is the potential clinical application of the insights gained from the research. The CCA grant aims to fund research projects for 1 to 2 years at various laboratories within Amsterdam UMC. Collaboration between different researchers residing at different Amsterdam UMC locations are encouraged in order to reinforce and complement professional networks.

11.3 MILLION EUROS FROM THE DUTCH CANCER SOCIETY

The Dutch Cancer Society (KWF Kankerbestrijding) holds competitive funding rounds for cancer research proposals twice a year. Important criteria are quality, feasibility, and relevance for the patient and society. The Dutch Cancer Society contributed approximately 60 million euros to new cancer research in the Netherlands in 2019. We received over 5 million euros in the first half of 2019, and 6.3 million euros in the second half. An overview of CCA projects funded by the Dutch Cancer Society is presented next.

Research facilitated by the Dutch Cancer Society (KWF)

In 2019, we received 11.3 million euros from the Dutch Cancer Society. This funding supports the following research projects.

RESEARCH PROJECTS

- Tanja Alderliesten: Fast, accurate, and insightful brachytherapy treatment planning for cervical cancer through artificial intelligence (790,000 euros)
- Jacques Bergman: Evaluation of minimally invasive, organ preserving endoscopic management for patients with T1bN0M0 esophageal adenocarcinoma: a prospective multicenter cohort study (571,000 euros)
- Marjolein van Egmond: How can we stimulate our own immune system to attack cancer cells? (549,000 euros)
- Mette Hazenberg: AML specific antibodies: origin of natural antibodies and development into therapeutic antibodies (520,000 euros)
- Heinz-Josef Klümpen: Adjuvant chemotherapy with gemcitabine and cisplatin compared to standard of care after curative intent resection of cholangio and gallbladder carcinoma (ACTICCA-1) (225,000 euros)
- Joke den Haan: Development of a flexible vaccine to stimulate the immune response against melanoma (618,000 euros)
- Yvette van Kooyk: How do we change the immune-suppressive tumor microenvironment of pancreatic cancer? (538,000 euros)
- Miranda Kusters: Evaluating and improving the multidisciplinary treatment of low rectal cancer in the Netherlands (835,000 euros)
- Nicolas Leveille: Wnt-regulated long noncoding RNAs as the Achilles' heel of colorectal cancer (583,000 euros)
- Florent Mouliere: Non-invasive detection of early stage cancer by analyzing the genome wide fragmentation of cell-free DNA (488,600 euros)
- Ellen Smets: Dr. Google in the consultation room – how does cancer patients' internet use affect clinician-patient communication and patients' well-being? (498,000 euros)
- Linda Smit: Targeting chemotherapy resistant acute myeloid leukemia cells to prevent leukemia recurrence (615,000 euros)
- Pieter Tanis: Multi-Interventional program for prevention and early Management of Anastomotic leakage after total mesorectal excision in Rectal cancer patIents, IMARI-study (500,000 euros)
- Sandra van Vliet: Uncovering the role of tumor sialylation in anti-tumor immunity in colorectal cancer (540,000 euros)
- André Vis: Can complete pathological response be predicted following neo-adjuvant chemotherapy in patients with muscle-invasive bladder-cancer to prevent radical cystectomy? (pre-PREVENCYS-trial) (448,000 euros)
-

YOUNG INVESTIGATOR GRANTS

Special category for young talented clinical researchers.

- Femke Jansen: Head and neck cancer long-term survivorship: Late effects, supportive care needs and healthcare utilization of survivors and their caregivers (616,000 euros)
- Vicky Lehmann: Fertility preservation at cancer diagnosis: Impact on survivors' reproductive goals, romantic relationships, and sexuality (409,000 euros)
- Daniël Miedema: The growth of colon cancer (483,000 euros)

CONSORTIUM PROJECTS

Opportunity for large or complex collaborations.

- Connie Jimenez: The phosphoproteome, key to derailed kinases in colon tumors and tailored therapy (1,091,000 euros)

UNIQUE HIGH-RISK PROJECTS

Financing for groundbreaking ideas.

- Jos Poell: Detection of sporadic DNA mutations for an accurate estimate of the risk of cancer (119,000 euros)
- Henk van Weert: AI-DOC: Artificial Intelligence for Detection of Cancer (235,000 euros)

PROJECTS WITH A CCA SCIENTIST AS CO-APPLICANT

- Anna Bruynzeel: A randomized trial to additional local treatment with high-precision-radiotherapy in patients with isolated local recurrence of pancreatic cancer. In collaboration with UMC Utrecht (489,000 euros)
- Joris Erdmann, Martijn Meijerink, Otto van Delden: DRAGON trial 1: training, accreditation, implementation and safety evaluation of DVE. DRAGON trial 2: PVE versus DVE. In collaboration with Maastricht UMC (811,000 euros)
- Frank Lagerwaard: Renewed radiation of recurrent glioma: which plan is best for the patient. In collaboration with UMC Utrecht (540,000 euros)
- Willemien Menke: SONImage: can molecular imaging predict the effect of CDK4/6 inhibition in addition to first-line hormonal therapy for patients with metastatic hormone-sensitive breast cancer? In collaboration with UMC Groningen (598,000 euros)
- Jeroen van Moorselaar: Local radiotherapy with short-term hormone therapy for limited metastases of recurring prostate cancer. In collaboration with UMC Groningen (900,000 euros)
- Renske Steenbergen, Fréderic Amant: Better preservation of fertility for women with cervical cancer using chemotherapy and less radical surgery (CONTESSA / NEOCON-F). In collaboration with NKI/AvL (393,000 euros)
- Erik Sistermans, Thomas Würdinger: OVI-DETECT Detection of genetic material in blood for better differentiation between benign and malignant tumors of the ovary. In collaboration with NKI/AvL (1,779,000 euros)
- Erik Thunnissen: Improvement of the diagnosis and systemic treatment of large cell neuroendocrine carcinoma (LCNEC) of the lung. In collaboration with Maastricht UMC (358,000 euros)
- Mark van de Wiel: Which blood test is best suited to monitor disease status in breast cancer patients undergoing neoadjuvant chemotherapy? In collaboration with Erasmus MC Rotterdam (166,000 euros)
- Josée Zijlstra: Prediction models to support the primary treatment choice of new-Hodgkin's lymphoma patients, and follow-up for survivors Hodgkin's lymphoma. In collaboration with NKI/AvL (619,000 euros)

Scientific publications 2019

Every year, our cancer research yields a long list of publications in leading scientific journals. Below is a selection of 20 high-impact publications. The whole list can be reviewed at

www.amsterdamresearch.org/web/cancer-center-amsterdam/research-4/facts-and-figures-annual-review-2019.htm

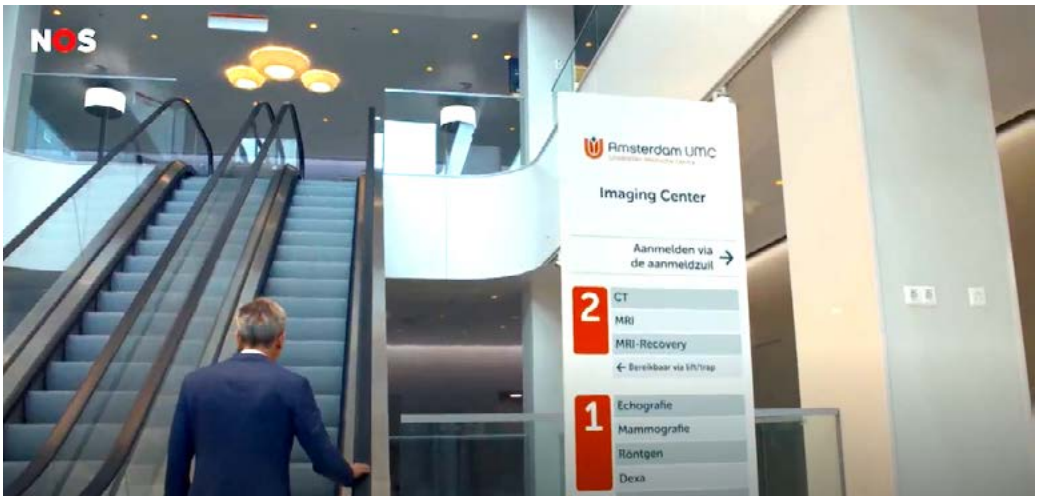
- Best, M.G. et al., March 2019, "RNA sequencing and swarm intelligence–enhanced classification algorithm development for blood-based disease diagnostics using spliced blood platelet RNA'. **Nature Protocols**, vol. 14, no. 4, pp. 1206-1234.
- Van Bruggen, J.A.C. et al., July 2019, 'Chronic lymphocytic leukemia cells impair mitochondrial fitness in CD8+ T cells and impede CAR T-cell efficacy', **Blood**, vol. 134, no. 1, pp. 44-58.
- Dekker, E. et al., October 2019, 'Colorectal cancer'. **The Lancet**, vol. 394, no. 10207, pp. 1467-1480.
- Van de Donk, N.W.C.J. et al., December 2019, 'Oral proteasome inhibitor maintenance for multiple myeloma', **The Lancet**, vol. 393, no. 10168, pp. 204-205.
- Van den Ende, T. et al., December 2019, 'A phase II feasibility trial of neoadjuvant chemoradiotherapy combined with atezolizumab for resectable esophageal adenocarcinoma: The PERFECT trial.', **Journal of Clinical Oncology**, vol. 37, no. 15.
- Van Groningen, T. et al., April 2019, 'A NOTCH feed-forward loop drives reprogramming from adrenergic to mesenchymal state in neuroblastoma', **Nature Communications**, vol. 10, no. 1, 1530, pp. 1530.
- Van Hilst, J. et al., January 2019, 'Laparoscopic versus open pancreatoduodenectomy for pancreatic or periampullary tumours (LEOPARD-2): a multicentre, patient-blinded, randomised controlled phase 2/3 trial'. The **Lancet. Gastroenterology & Hepatology**, vol. 4, no. 3, pp. 199-207.
- Joosten, SPJ. et al., October 2019, 'MET signaling overcomes epidermal growth factor receptor inhibition in normal and colorectal cancer stem cells causing drug resistance', **Gastroenterology**, vol. 157, no. 4, pp. 1153-1155.e1.
- Kater, A.P. et al., August 2019, 'Ibrutinib and venetoclax for first-line treatment of CLL', **New England Journal of Medicine**, vol. 381, no. 8, pp. 788-789.
- Klaver, C.E.L. et al., October 2019, 'Adjuvant hyperthermic intraperitoneal chemotherapy in patients with locally advanced colon cancer (COLOPEC): a multicentre, open-label, randomised trial', **The Lancet. Gastroenterology** and Hepatology, vol. 4, no. 10, pp. 761-770.
- De Klerk, C.M. et al., November 2019, 'Performance of two faecal immunochemical tests for the detection of advanced neoplasia at different positivity thresholds: a cross-sectional study of the Dutch national colorectal cancer screening programme', The Lancet. **Gastroenterology & Hepatology,** vol. 4, no. 2, pp. 111-118.
- Lenos, KJ. et al., August 2019, 'A marker-independent lineage-tracing system to quantify clonal dynamics and stem cell functionality in cancer tissue', **Nature Protocols**, vol. 14, no. 9, pp. 2648-2671.
- Palma, D.A. et al., May 2019, 'Stereotactic ablative radiotherapy versus standard of care palliative

treatment in patients with oligometastatic cancers (SABR-COMET): a randomised, phase 2, open-label trial', **The Lancet**, vol. 393, no. 10185, pp. 2051-2058.
- Pegtel, D.M. et al., June 2019, 'Exosomes', **Annual Review of Biochemistry**, vol. 88, pp. 487-514.
- Polman, N.J. et al., February 2019, 'Performance of human papillomavirus testing on self-collected versus clinician-collected samples for the detection of cervical intraepithelial neoplasia of grade 2 or worse: a randomised, paired screen-positive, non-inferiority trial', **The Lancet. Oncology**, vol. 20, no. 2, pp.
- Rovithi, M. et al., February 2019, 'Phase I dose-escalation study of once weekly or once every two weeks administration of high-dose sunitinib in patients with refractory solid tumors', **Journal of Clinical Oncology**, vol. 37, no. 5, pp. 411-418.
- Sánchez-Querubín, N. et al., July 2019, 'Vlogging at the end of life', **The Lancet. Oncology**, vol. 20, no. 7, pp. 911-912.
- Van der Pol, Y. et al., October 2019, 'Toward the early detection of cancer by decoding the epigenetic and environmental fingerprints of cell-free DNA', **Cancer Cell**, vol. 36, no. 4, pp. 350-368.
- Vaarwerk, B. et al., March 2019, 'Indeterminate pulmonary nodules at diagnosis in rhabdomyosarcoma: are they clinically significant? A report from the European paediatric soft tissue sarcoma study group', **Journal of Clinical Oncology**, vol. 37, no. 9, pp. 723-730.
- Van der Velden et al., September 2019, 'The Drug Rediscovery protocol facilitates the expanded use of existing anticancer drugs', **Nature**, vol. 574, no. 7776, pp. 127-131.

A spotlight on: OncoKompas in Lancet Oncology

The leading journal Lancet Oncology published a study on OncoKompas. This initiative by professor Irma Verdonck-de Leeuw offers 'support when living with cancer' with practical information, insights, and advice. From 2016-2018, a nationwide randomized trial was conducted in 14 hospitals into the (cost) effectiveness of OncoKompas among patients who had cancer of the breast, colon, head and neck, or lymph nodes. In total, 625 people participated in this study. The results showed that OncoKompas was effective in improving quality of life and reducing tumor-specific symptoms. The effectiveness of OncoKompas has been clinically validated for people after curative cancer treatment:

- it reduces symptoms
- it is effective and cost effective
- it brings oncological aftercare closer to home
- it improves the distribution of information about the possibilities of aftercare for cancer



Images taken from video provided by NOS

Publications in national media

In 2019, various national media outlets published news items covering our work. Through these publications, the general public stays informed about the latest developments at our institute.

NOS (the Dutch Broadcasting Foundation) extensively covered the opportunities offered by the recently opened Imaging Center. The television program Nieuwsuur broadcast an interview with Guus van Dongen, founder of the center.

nos.nl/nieuwsuur/artikel/2307910-ziekenhuis-opent-centrum-als-oplossing-voor-dure-en-ineffectieve-medicijnen.html

nos.nl/nieuwsuur/video/2308175-medicijngebruik-is-een-soort-russische-roulette.html

RTL Nieuws (a popular media outlet) published an article on our research with the electronic nose detector (e-nose), a device that can help determine whether lung cancer patients would benefit from immunotherapy.

rtlnieuws.nl/nieuws/nederland/artikel/4852371/elektrische-neus-longkanker-immuuntherapie-onderzoek-behandeling

Zorgkrant (a weekly newspaper published by the Foundation Care Net Holland) spotlighted research conducted by the team of surgeon Miranda Kusters which showed that tumor tissue in rectal cancer can be more accurately removed by using a fluorescent contrast fluid.

zorgkrant.nl/wetenschap-en-onderwijs/10895-behandeling-darmkanker-veelbelovend

Meet our new professors

Professors play an essential role in educating the next generation of doctors and researchers. We are therefore very proud to present our newly appointed professors of 2019. Together with the other professionals, they ensure that our doctoral candidates can successfully complete their PhD programs. See the results of their efforts in the section 'PhD Graduations 2019' below.

Prof. Dr. Josée Zijlstra-Baalbergen, appointed Professor of Functional Imaging in Hematology as of September 1, 2019.

Prof. Dr. Renske Steenbergen, appointed Professor of Experimental Pathology as of September 1, 2019.

Prof. Dr. Jacqueline Cloos, appointed Professor of Translational Hematology, in particular acute leukemia, as of May 1, 2018. Inaugural lecture: (R)evolution in leukemia.

Prof. Dr. Joanne Verheij, appointed Professor of Hepatopancreatobiliary Pathology as of December 10, 2019.

Prof. Dr. Bart Biemond, appointed Professor of Hemoglobinopathy as of December 4, 2018. Inaugural lecture: Sickle and the Scythe.

Prof. Dr. Tuna Mutis, appointed Professor of Immunotherapy against Hemato-Oncological Diseases as of May 1, 2018. Inaugural lecture: Track, Trace, Entangle and Go.

Images: Mark van de Brink

Prof. Dr. Philip de Witt Hamer, appointed Professor of Translational Brain Tumor Research, section of the Department of Neurosurgery, as of December 1, 2019.

Prof. Dr. Louis Vermeulen, appointed Professor of Molecular Oncology as of October 1, 2017. Inaugural lecture: Molecular oncology – opportunity and necessity.

Prof. Dr. Fons van den Eertwegh, appointed Professor of Clinical Immuno-Oncology as of September 1, 2018. Inaugural lecture: Immuno-oncology: a matter of patience.

Prof. Dr. Pieter Tanis, appointed Professor of Surgery, in particular colorectal surgery, as of July 2, 2019.

Prof. Dr. Paul Fockens, appointed Professor and Chair of Gastroenterology, Hepatology and Gastrointestinal Endoscopy as of June 1, 2019.

Not shown are: Prof. Dr. Martijn Meijerink, appointed Professor of Oncological Intervention Radiology as of August 1, 2019, and Prof. Dr. Hans van der Vliet, appointed Professor of Medical Oncology as of September 1, 2019.

Image: Marlous Pulles

FIRST PROFESSOR IN CLINICAL PALLIATIVE CARE

Lia van Zuylen was appointed as the first professor in Clinical Palliative Care at the Department of Medical Oncology. She believes that doctors can play an important role for patients in the final stage of life when recovery is no longer possible. Van Zuylen proposes that professional training must include preparations for questions and concerns that patients may have for this life stage. "Patients are helped when all questions, including those about the outlook of the disease and the expected end of life, can be discussed in a timely manner," van Zuylen says. "It is important that (future) professionals are equipped for discussions about death. Thinking about the end of life does not start a few days before someone's death." She argues that it may be an appropriate subject at the time of diagnosis or when discussing the choice of treatment. The scientific question of which mechanism triggers a person to die is also important: "A colleague recently said: 'We have been dying for thousands of years, but we know so little about the process of dying.'"

PhD Graduations 2019

In chronological order:

- Kramer, G.M. 'Validation of Imaging Biomarkers for Response Evaluation in Lung and Prostate Cancer'
- Ren, Z. 'Heparan sulfate proteoglycans: key moderators of the interaction of multiple myeloma with the bone marrow niche'
- Savcı Heijink, C.D. 'Genomic characteristics of metastatic breast cancer'
- Senft, A. 'Screening for distant metastases in head and neck cancer patients using 18FDG-PET and chest CT'
- Jin, P. 'Geometrical variability of esophageal tumors and its implications for accurate radiation therapy'
- Van Hilst, J. 'Minimally invasive pancreatic surgery: Introduction, development, and outcome assessment'
- Van Rijssen, L.B. 'The Dutch Pancreatic Cancer Project: Optimization of clinical research in pancreatic cancer'
- Haan, J. 'Cancer and Pregnancy: Past, Present and Future'
- Van der Geest, L.G.M. 'Quality of care for pancreatic cancer patients, with focus on the elderly'
- Schuurhuizen, C.S.E.W. 'Optimizing psychosocial support and symptom management for patients with advanced cancer'
- Crombag, L.M.M. 'Endosonography for lung cancer staging'
- Chaturvedi, N. 'Statistical modelling for integrative analysis of multi-omics data'
- Zhang, T. 'Image analysis methods for dynamic hepatocyte-specific contrast enhanced MRI'
- De Vries, A.M.M. 'Physicians\ defence mechanisms during communication with advanced cancer patients'
- Scholten, L. 'Total or partial pancreatectomy: Indications, surgical and functional outcomes'
- Prasetyanti, P.R. 'Development of patient-derived models to study tumor heterogeneity: Studies of colorectal cancer'
- De Klerk, C.M. 'Optimizing colorectal cancer screening using fecal immunochemical tests'
- Van Eeghen, E.E. 'Outcomes of Colorectal Cancer treatment in daily practice, a descriptive study'
- Van Andel, H. 'Wnt signaling in the pathogenesis of multiple myeloma'
- Klompmaker, S. 'Expanding eligibility and improving patient outcomes for pancreatic surgery'
- Sweegers, M.G.C. 'Measuring and understanding the effects of physical activity on physical fitness, fatigue and quality of life in patients with cancer'
- Zhuang, M. 'Segmentation and quantitative analysis in whole-body PET imaging'
- Polman, N.J. 'HPV-based cervical screening: Challenges and future perspectives.'
- Westerduin, E. 'Complications and salvage surgery following restorative and non-restorative rectal cancer resection'
- Veltcamp Helbach, M. 'Innovative surgical approach for rectal cancer: Transanal Total – Mesorectal Excision'
- Huijskens, S.C. 'Organ motion in children for high-precision radiotherapy: Why treat children like adults?'
- Bahjat, M. 'The delicate balance between DNA damage and repair in B cells'
- Van Heerden, L.E. 'Multi-modality radiotherapy in cervical cancer: Impact on the 3D dose distribution'
- De Boer, P. 'Reducing small bowel toxicity in locally advanced cervical cancer treatment'
- Wentink, M.Q. 'Immunotherapy and combined treatment approaches to angiogenesis inhibition'
- Hompes, R. 'Transanal total mesorectal excision: From inception to implementation'
- Roos, E. 'A translational approach towards perihilar cholangiocarcinoma'
- Van der Werf, A. 'Nutritional support for patients with metastatic cancer'
- Van Dinther, D. 'Interplay of CD169+ macrophages and dendritic cells: a game of give and take to induce anti-tumor T cell immunity'
- Cornelissen, L.A.M. 'Tumor-associated glycan structures: friend or foe in immunity to cancer?'
- Van de Lindt, T.N. 'Managing Motion in MRI-guided Liver Radiation Therapy'
- Belghazi, K. 'Optimization of endoscopic treatment for Barrett's esophagus with early neoplasia test M'S'
- Huijts, C.M. 'Translational studies on the therapeutic control of regulatory T cells in renal cell cancer: suppressing the suppressors'
- Jauw, Y.W.S. '89Zr-immuno-PET: Towards a clinical tool to guide antibody-based therapy in cancer'
- Zhang, Q. 'Distortion-free high-resolution diffusion MRI'
- Delaney, A.R. 'Knowledge-based treatment planning for radiotherapy'
- Van Ravesteyn, T.W. 'Replication-coupled Gene Editing in Mammalian cells'
- Vroomen, L.G.P.H. 'Electroporation in Interventional Oncology'
- Kok, J.L. 'Radiation exposure assessment and risk of subsequent tumors in childhood cancer survivors'
- Bus, M.T.J. 'Radiation exposure assessment and risk of subsequent tumors in childhood cancer survivors'
- Vogel, J.A. 'Irreversible electropor'ation in locally advanced pancreatic cancer'
- Overbeek, J.A. 'Type 2 diabetes, its pharmacological treatment and associations with cancer: (Pharmaco)epidemiological studies based on data from the PHARMO DIAMANT cohort'
- Leeksma, A.C. 'Making sense of genomic complexity and nonsense-RNA in hematologic malignancies'
- Schooneveldt, G. 'Computational fluid dynamics powered treatment planning to improve temperature predictions for bladder hyperthermia'
- Heineman, D.J. 'Clinical staging of Non-Small Cell Lung Cancer'
- Van der Weele, P.S.J. 'Molecular characterization of HPV infection: Evaluation of vaccine effects, viral diversity and variant development'
- Huiskens, J. 'Improvement in treatment of colorectal liver metastases and the conduct of clinical research'
- Wieldraaijer, T. 'General practitioner involvement in colorectal cancer survivorship care'
- Duits, L.C. 'Risk stratification in Barrett's esophagus'
- De Neree tot Babberich, M. 'Quality assessment, assurance and improvement through clinical auditing: The colorectal cancer case'
- Hira, V.V.V. 'No more hide and seek for glioma stem cells in their protective niches'
- Voncken, F.E.M. 'Oesophageal cancer: Towards individualised multimodality treatment'
- Heukelom, J. 'Head and neck radiotherapy challenges: Cure versus toxicity'
- Snoek, B.C. 'Early detection of cervical cancer: The quest for novel epigenetic biomarkers'
- Bruns, E.R.J. 'Towards resilience: Prehabilitation for the elderly with colorectal cancer'
- Schreuder, A. 'Complications in hepato-pancreato-biliary surgery: Multidisciplinary and interdisciplinary approach"
- Jelvehgaran Esfahani, M. 'Optical coherence tomography of the esophagus in radiation therapy'
- Vaarwerk, B. 'Optimizing rhabdomyosarcoma treatment: Assessing the role of imaging and local treatment in pediatric rhabdomyosarcoma'
- Verly, I.R.N. 'Catecholamine metabolites in neuroblastoma patients'
- Leijssen, L. 'Clinical and pathological prognostic factors in colon and rectal cancer'
- Fan, T.S. 'Herpesvirus-Encoded G Protein-Coupled Receptor Signaling and its role in the Modulation of Glioblastoma Multiforme'
- Zaman, A.C.G.N.M. 'Tailored work-related support for patients with gastrointestinal cancer: Development and evaluation of an early intervention in clinical practice'
- Douma, L.N. 'Colorectal cancer screening: Yes or No? Insights into public opinion and the individual decision-making process'
- Loots, E. 'Oesophagus cancer on the east coast of South Africa'
- Van Diessen, J.N.A. 'Locally advanced lung cancer: Improved patient selection and treatment'
- Van der Wel, M.J. 'What makes an expert Barrett's pathologist? Concordance and pathologist expertise within a digital review panel'
- Ter Veer, E. 'Systematic approach to unify evidence for advanced upper gastrointestinal cancer treatment'
- Ten Koppel, M. 'Palliative care in long-term care facilities: a European perspective: Evaluating palliative care in cross-country quantitative and qualitative research'
- Muller, B.G. 'Prerequisites for patient-tailored treatment in localized prostate cancer'


CLINICAL STAGING NON-SMALL CELL LUNG
for advanced upper gastrointe
cancer treatment
Emil ter Veer
Managing Motion in MRI-guided Liver Radiation The
Tessa van de Lindt
with focus on the elderly
Innovative surgical approach rectal cancer
AN EXPERT BARRETT PATHOLOGIS
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MALIGNANCIE
Alexander Christiaan Leek
CLINICAL and PATHOLOGIC PROGNOSTI FACTORS in COLON and RECTAL CANCER
Minimally invasive pancreatic
Jony van Hilst
Type 2 diabetes, its pharmacological treatmen and associations with cancer
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HPV-BASED CERVICAL SCREENING
CHALLENGES AND FUTURE PERSPECTIVES
Nicole Polman
Development of Patient-Deriv to Study Tumor Heteroge Studies of Colorectal Ca
Eva Roos
A Translational Appr Towards Perihilar Cholangiocarcinoma
Total or partial pancreatectomy indications, surgical functional outcom
GERBEN SCHOONEVELDT
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Improvement in treatment of colorectal liver metastases and the conduct of clinical research
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IRENE KLAASSEN
EXPANDING ELIGIBILITY AND IMPROVING PATIENT OUTCOMES
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The RAS-MAPK pathwa in neuroblastoma
Thomas Eleveld
Genomic characterization of metastatic breast cancer
Quality assessn assurance and impr through clinical a the colorectal cancer
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Insights into public opinion individual decision-making
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By Vaishendrya Vindhya Vasini
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CANCER AND PREGNANCY
Past, Present and Future
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OUTCOMES OF COLOREC CANCER TREATMENT I DAILY PRACTICE
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Electroporation in Interventional
NUTRITIONAL SUPPO FOR PATIENTS WITH METASTATIC CANCER

News in Brief

SHARING KNOWLEDGE, LEARNING WITHOUT BORDERS

Our oncology specialists stimulate knowledge exchange through attendance at national and international meetings. They gave presentations at conferences and seminars, such as the Liquid Biopsy Summit (Rotterdam, 2019) and many other (inter)national conferences. In addition, we welcomed international delegations from numerous countries, including Colombia. International exchanges were also stimulated through training courses for our professionals. As scholars of the Oncology Research School Amsterdam (OOA), our PhD students were offered advanced specialized courses. In addition, international exchanges for PhD students were facilitated.

FIRST GRADUATION IN THE DIAMOND PROGRAM

The Diamond Program sponsors exceptionally talented masters students who want to do doctorate research at the Oncology Research School Amsterdam. Josephine Kahn was the first researcher to graduate via this program. In her thesis 'Chemotherapy resistance mechanisms and targeted therapies in leukemia', she details her investigation into chemotherapy resistance in leukemia cells. Her research led to the identification of a new therapy that selectively kills mutated cells. The Diamond program at the Cancer Center Amsterdam is supported by a grant from the Dutch Research Council (NWO).

RETREATS 2019

Retreats provide an opportunity for participants to exchange knowledge in an informal setting, learn from each other, and develop active networks. Each year, the Oncology Research School Amsterdam (OOA) holds a retreat at Renesse, and the CCA holds a retreat at Noordwijkerhout. Both events were very well attended in 2019.

Image: Claudia Kamergorodoski

PROGRESS THROUGH STATE-OF-THE-ART ONCOLOGY EDUCATION

The Oncology Research School Amsterdam (OOA) is the only school in the Netherlands that focuses primarily on oncology education. A broad and advanced educational package is provided by leading researchers and doctors in the field of oncology. The 2019 Basic Oncology Course taught all new OOA-PhD students general basic knowledge. Students were also offered more specific courses covering cutting-edge topics such as innovative research techniques and tumor types. In 2019, fifteen distinct courses were organized by OOA. In addition, various seminars and symposia were organized for postdoctoral researchers and PhD students during the year, such as the Post-Doc Alliance Initiative, CCA Next, and CCA Seminars.

SUPPORTING TALENTED PROFESSIONALS AND STUDENTS WITH AN INTEREST IN ONCOLOGY

Amsterdam UMC offers education and training for students, doctors and scientists with an interest in oncology in collaboration with the University of Amsterdam (UvA) and the VU University (VU). Examples include:

- The oncology trajectory via the UvA's Biomedical Sciences master's program with subjects such as cell biology, molecular biology, and genetics. The goal: education of future professionals capable of developing new strategies for the diagnosis and treatment of cancer.
- Bachelor's and master's programs, a lateral entry program into the School of Medicine, a master's in Oncology, and a master's program in Epidemiology. Students are educated and investments are made to progress the professionalization of teachers and trainers in healthcare education, and for the advanced training of medical specialists.

TRAVEL SCHOLARSHIPS FOR PHD STUDENTS AND POSTDOCS

Several PhD students and postdocs received travel scholarships that have enabled them to learn and develop new techniques abroad. The applications were assessed based on the added value for research in the CCA. The scholarships were awarded to ten PhD students for research at international institutions such as the University of Michigan Hospitals and Health Centers (USA), the Norwegian University of Science and Technology (Norway), and the University of Liverpool (GB). Fleur Cornellisen received her travel grant to do research at the University of California San Diego (USA) under supervision of Cornelis Murre, who obtained a visiting professorship supported by CCA funding. Her project was entitled 'Uncovering the relation between chromatin conformation and therapy resistance in glioblastoma'.

PROGRESS IN SERVING PATIENTS: '2 HANDEN OP 1 BUIK' AWARD FOR GEERT KAZEMIER

A lot is possible in oncological care, but not all options are always in the interest of the wellbeing of the patient. The Maag Lever Darm Stichting (the Dutch gastrointestinal and liver disease foundation) awards the '2 handen op 1 buik' ('hand in hand') prize to doctors who place making decisions together with the patient at the center of their practice. In 2019, the award went to Oncological Surgeon Geert Kazemier. "I think deciding together with patients is very important. I want to make sure that they support the choices we make together. That 'togetherness' is central to me. It is a wonderful compliment that my patients appreciate this and have nominated me for this award."

TANJA DE GRUIJL, PROFESSOR OF TRANSLATIONAL TUMOR IMMUNOLOGY, ON THE BOARD OF THE SOCIETY FOR IMMUNOTHERAPY OF CANCER (SITC)

The Society for Immunotherapy of Cancer is an international organization that supports and promotes cancer immunotherapy research and treatments to improve outcomes for patients with cancer. Professor of Translational Tumor Immunology, Tanja de Gruijl, has been elected to the board of this not-for-profit society with almost 3,000 members from 48 countries representing more than 35 medical specialties.

Tanja de Gruijl

Image: Paul Ridderhof

Action employees at the TCS Amsterdam Marathon

EVERYONE CAN HELP

Great involvement from all corners of society

The desire to make a difference for cancer patients does not only motivate medical professionals. From volunteers and donation solicitors to research participants: people are helping from all corners of society. In 2019, there were many initiatives to bring our common goal closer: finding better solutions and improving the opportunities for cancer patients now and in the future.

CONTRIBUTIONS CAREFULLY MANAGED AND UTILIZED

The Cancer Center Amsterdam Foundation ensures that private donations are properly managed and utilized. Over the years, donations to the Foundation have facilitated cancer research and the purchase of scientific equipment.

> “It remains very special, and also very important, that we receive financial support from private donors. Because of their involvement in our work, we are able to fund research that is valuable for patients.”
>
> - Geert Kazemier, director of the Cancer Center Amsterdam Foundation.

From marathons to macarons

A selection of the 2019 fundraising initiatives

POSITIVE ENERGY AT TCS AMSTERDAM MARATHON

Various professionals, organizations, and people have raised money through sporting events affiliated with the Cancer Center Amsterdam. A good example is the annual TCS Amsterdam Marathon, with all the proceeds going to the Cancer Center Amsterdam. By participating annually, our own CCA colleagues put their 'best foot forward' together with many others, including the people of the retail chain 'Action' and their suppliers. Barbara Heintz of Action organizes their participation and is impressed by the enormous enthusiasm of long-distance runners from different parts of the organization.

TCS Amsterdam Marathon is famous for the beautiful course through Amsterdam, the finish in the Olympic Stadium, and for the world-class performances of participants, which has made it one of the fastest marathons in the world. The Cancer Center Amsterdam was the official charity of the TCS Amsterdam Marathon for the ninth time in 2019. Many of our colleagues contribute by participating in the marathon. Employees and supplier of store chain Action also participate ever year. Barbara Heintz of Action organizes the participation: "The enthusiasm of participants from different parts of the organization and suppliers is great".

> "Every year, Action colleagues from different business units and positions enthusiastically participate in the marathon. It is a unique sporting get-together for them where a lot of positive energy is released, precisely because our joint efforts support such an important goal."
>
> – Barbara Heintz, Action.

RESEARCH PARTICIPANTS DRIVE PROGRESS

Whether it is to develop better treatments, find out more about the disease, or to learn how to improve the quality of life with cancer, the participation of patients (and sometimes healthy people) is indispensable for research. Today's patients enable us to make improvements for those of the future. Many patients participated in research in 2019. The importance of this is enormous. We cannot thank them enough.

HEALTHY DONORS DAY

For some studies, we need healthy donors. To this end, Healthy Donors Day was organized by the Liquid Biopsy Center (LBC). Healthy individuals donated 50 ml of blood to the LBC, an invaluable gift. The center uses different types of body fluids, such as blood and urine, from healthy people and cancer patients in their investigations to support the development of less invasive diagnostic methods and possibly new therapies. Healthy Donors Day was especially aimed at supplementing the liquid biopsy 'biobank' with material from healthy individuals, and many people contributed to a very successful day.

ARTISTS DRAW ATTENTION TO RESEARCH

- Presenter, model and former video jockey Renate Verbaan 'performed an internship' with Prof. Arjan Griffioen, Professor of Angiogenesis. She made a video highlighting his research into a vaccine to treat and protect against cancer.

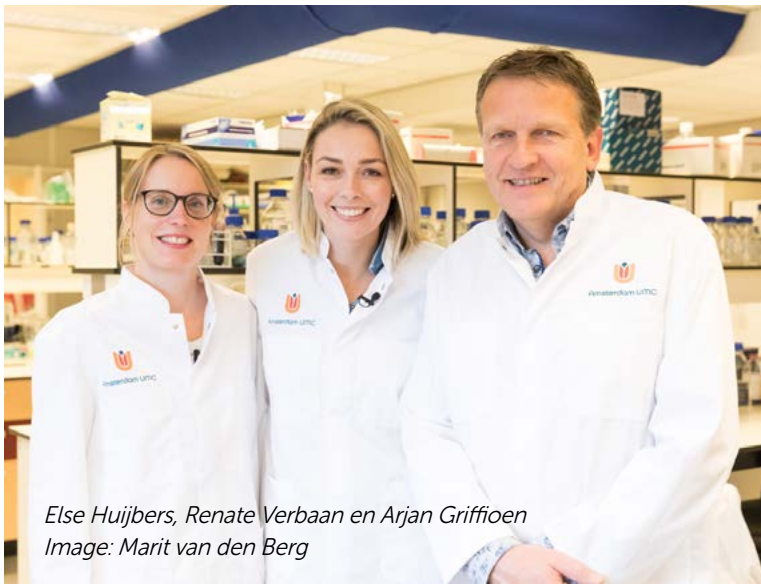
See a report of her internship here: tiny.cc/renateverbaanCCA

- The popular Parallels DJs (Julien and Thomas de Bie) recorded a music video in our research institute as part of their series 'A day at ...' and incorporated sound samples made by typical laboratory equipment. With this video, 'A day at the Cancer Center', they are raising money for the CCA and cast the importance of cancer research in a musical spotlight.

Watch the video here: tiny.cc/parallellsCCA

BICYCLE FUNDRAISING

In 2019, various fundraising initiatives also came from the researchers themselves. For example, the Co-Cycling Foundation is an initiative of medical interns at the Amsterdam UMC who, besides their medical studies, are also avid cyclists. Since 2014, they have organized the annual Co-Cycling Tour: a bicycle tour around Amsterdam for cyclists at all levels to collect money for charities. The proceeds went to the Cancer Center Amsterdam in 2019.



Else Huijbers, Renate Verbaan en Arjan Griffioen
Image: Marit van den Berg

HYACINTH CAMPAIGN FOR YOUNG PEOPLE WITH CANCER

The National AYA 'Young and Cancer' platform organized the HAYAcinth campaign for the fifth time together with the Dutch hyacinth growers. The growers selflessly donated 5000 bunches of flowers which were sold by several hospitals to raise money for the care of young adults with cancer. The AYA also hosts the AYA lounge, a place where young people with cancer can meet and exchange experiences. During special AYA hours, young people can meet one-on-one with an AYA nurse during which age-specific questions or other concerns can be addressed.

Read more about young adults and cancer at ayazorgnetwerk.nl

WELCOMING PATIENTS WITH MACARONS

On World Cancer Day (February 4), we were able to treat our patients at both locations with delicious macarons thanks to the Otelli ice cream parlor. A small gesture to allow a moment of positive reflection away from the everyday impact of dealing with cancer.

An exceptional gift from a patient

Extra boost for brain tumor research

In 2019, we received an exceptionally generous donation from a patient who wishes to remain anonymous. The substantial donation of 2.5 million euros to the Cancer Center Amsterdam Brain Tumor Center enables us to develop a comprehensive research plan aimed at improving the quality of life for patients with brain tumors. Thanks to this generous gift, we can support this research for the next five years.

ATTENTION TO DAILY FUNCTIONING

Currently, practitioners mainly focus on the diagnosis and treatment of a brain tumor and relatively little attention is paid to the daily functioning of the patient. However, especially with brain tumors, a patient's daily life can be profoundly impacted. Research into how to deal with problems such as fatigue, anxiety, and forgetfulness is therefore very important. Thanks to this anonymous donation, we can examine these issues in detail. The research plan is already completed and we will start by exploring two interventions that have been found to be beneficial for patients according to scientific literature: medical cannabis for anxiety treatment, and cognitive behavioral therapy for fatigue.

HELPING A VULNERABLE GROUP

At the Brain Tumor Center, doctors and researchers from different disciplines work together. Neurosurgeon and initiator of the study, Philip de Witt Hamer, speaks on behalf of the team: "We share a medical history with our anonymous donor. Thanks to his experience and involvement, we were able to develop this research proposal. Brain tumor patients are a vulnerable group. Improving their quality of life, even if it is sometimes short, is very valuable."

Especially with brain tumors, a patient's daily life can be profoundly impacted. Research into how to deal with problems such as fatigue, anxiety, and forgetfulness is therefore very important.

- Philip de Witt Hamer, Neurosurgeon.

We are going to delve into treatments that can make a difference in the daily functioning of patients. In doing so, we will expressly look at individual differences in the effectiveness of the therapies. We hope to be able to predict in the future what will provide the best benefit for each individual patient.

- Linda Douw, Neuropsychologist and project leader.

Volunteers make the difference

Care for cancer patients is impossible without the support of our volunteers. An extra friendly word, practical help, or a listening ear: it is all invaluable. Elisabeth Tol is one of our indispensable volunteers.

THE IMPORTANT ROLE OF THE HOSTESS

Elisabeth worked as a nurse for 43 years. If she would consider a volunteer job after her retirement, it would certainly not be in a hospital, she thought. But then she saw a call for a hostess or host in the outpatient clinic for cancer patients. "I read how important it is that patients feel welcome and put at ease, and how important the role of the hostesses and hosts is in this. During the interview with the volunteer coordinator, I again felt a great connection with oncological patients."

THE HUMAN TOUCH

It would be a shame not to use that involvement and experience, Elisabeth reasoned. A day can vary enormously when hosting, from topping up the pantry to organizing the magazines. But it is the interactions with patients and their families that really matter. "Telephone calls, short conversations while serving coffee, giving information to patients who come for the first time, and catching up extensively with people with whom I have built a special relationship over time. People come from everywhere, from Limburg to Staphorst, and it is wonderful to have time for them and offer some comfort, or to be thankful with them if their health improves. I have the feeling that I can make a real difference when it is needed. And I also get so much in return. It is mostly the small things that touch me."

> "I have the feeling that I can make a real difference."
>
> - Elisabeth Tol, hostess outpatient clinic for cancer patients.

SPECIAL MOMENTS

Tol recalls the conversations she had with an elderly couple who came to the clinic. The wife was in treatment and participating in an experimental study. “At some point, they stopped coming and then you know that the treatment has stopped. After some time, I saw the funeral notice. It reminded me of how much I missed them. I remembered our conversations about how they met, where they were born - just like me in the Beemster - and how they went to the fair together. I was thrilled to see how well and lovingly he took care of her.”

A young woman who had just become a mother is also seared into her memory. “She came to the clinic with her baby, so wonderfully, unabashedly proud of him. On each subsequent visit, I saw the boy grow bigger and, despite the sad reason they were at the clinic, our interactions were happy and cheerful. She was always excited that I remembered his name. And many patients are just as interested in us as we are in them. It is as if simple human contact becomes extra intense in difficult situations.”

Text: Joke van Diemen-Markx

At a glance

COLLABORATION BETWEEN NEUROSCIENCE AND ONCOLOGY RESEARCHERS

- Collaboration between healthcare and research
- Collaboration between scientists in the proposed research building ADORE
- Access to research facilities and funding
- Regional and international collaboration

TREATMENT ACCORDING TO THE LATEST INSIGHTS

- Academic knowledge about all diseases
- Complex care by specialist doctors and nurses
- Participation in experimental treatments
- Supportive care, such as psychological help, physiotherapy, dietetics, and lifestyle outpatient clinic

AWARDED SCIENTISTS IN 2019

- 1 Spinoza Prize
- 1 ERC Consolidator Award
- 2 ERC PoC Awards
- 1 VENI Grant
- 1 VIDI Grant
- 1 NWO TOP grant
- 1 Knighthood
- 31 Dutch Cancer Society Projects

UNIQUE FACILITIES

- Medical imaging on one location (Imaging Center)
- Amsterdam Skills Centre

GROUNDBREAKING RESEARCH INTO CANCER

- More than 1400 researchers
- AI research facilitated by collaboration with SAS
- In-house unique research facilities like the Liquid Biopsy Center
- Fundamental and translational scientific research and clinical trials

TRANSFER OF KNOWLEDGE AND SKILLS TO (FUTURE) PROFESSIONALS

- 157 professors
- 550 PhD students
- 75 PhD graduations
- 1127 scientific publications
- 7 travel grants
- Oncology Research School Amsterdam
- Oncology Basic Knowledge Course for PhD students and clinical fellows
- Annual Retreats for all oncology physicians, researchers, technicians, research nurses
- Amsterdam Skills Centre (for Amsterdam UMC, opened in 2019)
- (inter)national lectures and seminars

Colophon

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