



Tays Cancer Centre

ANNUAL REPORT
2018



At the forefront of development

IN 2018, TWO MAJOR IMPROVEMENTS in the organisation of cancer care and research at the University Hospital area happened. Firstly, our regional cancer centre FICAN Mid was established in May 2018. The tasks of FICAN Mid are defined mainly by the Ministry of Social Affairs and Health, and the regional cancer centre works together with other regional cancer centres in Finland.

Secondly, after over two years of preparatory work, the organisation of Tays Cancer Centre, which includes all cancer care at the University Hospital and cancer research carried out at Tampere University, was stabilised. The Tays Cancer Centre Board had its first meeting in June 2018, and the operating structure of Tays Cancer Centre is now fully implemented.

One of the first tasks of Tays Cancer Centre Board was to update its cancer strategy. The contents of the strategy can be summarised with five key words or phrases: Patient centeredness, professionalism, communication, continuous learning through research and education, and being at the forefront. These terms represent values and properties, which we want to develop and improve.

Tays Cancer Centre wants to serve everyone who uses its services in the best possible way. In order to do this, we hope to receive feedback from you about our services. In the Tays Cancer Centre Annual report, we share stories and facts about our wide range of activities. We hope you enjoy it!

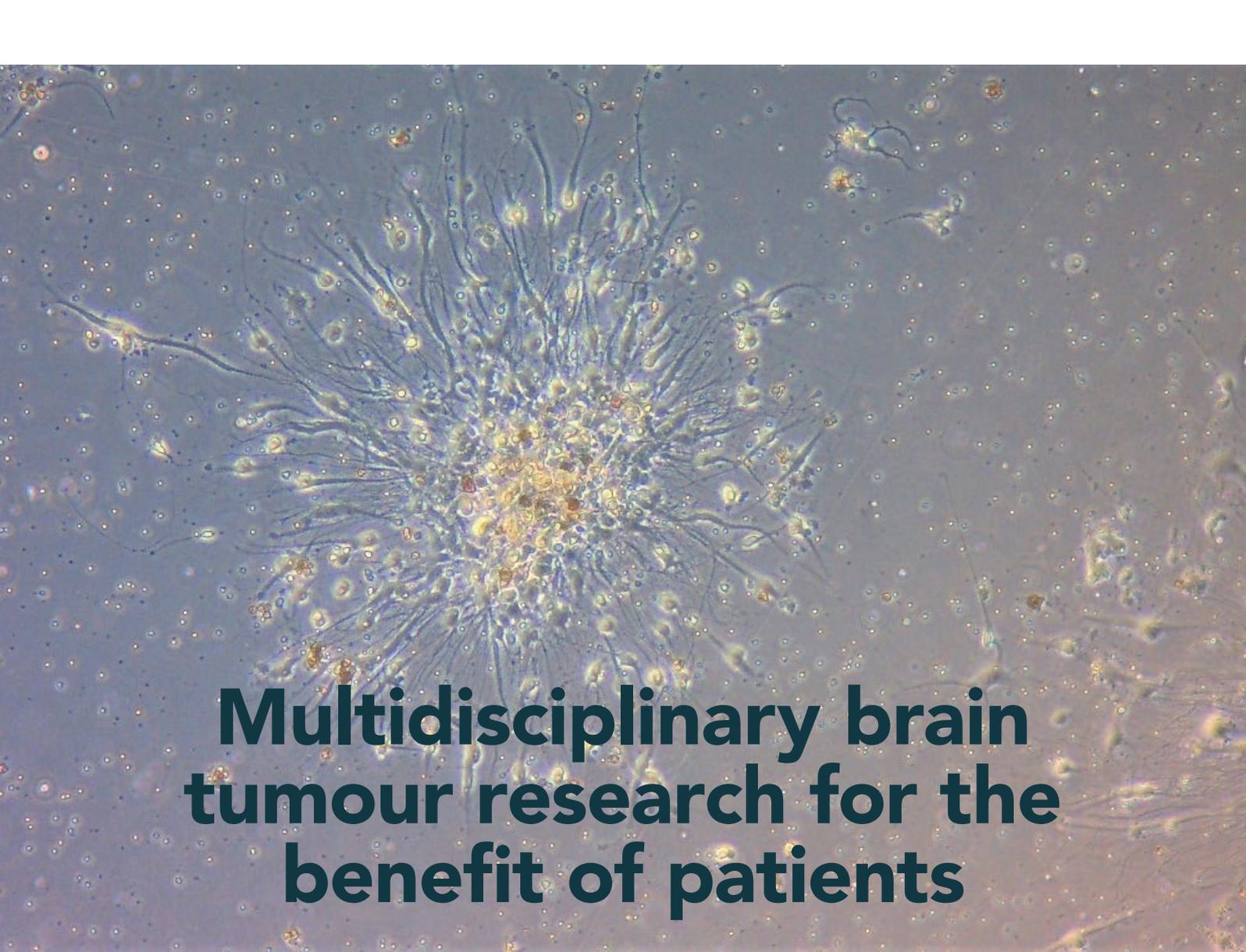
Chief Physician, Adjunct Professor

Annika Auranen

Administrative Director, Tays Cancer Centre

Director, FICAN Mid





Multidisciplinary brain tumour research for the benefit of patients

We need more information about brain tumours to improve their diagnostics and treatment.

TEXT Tarja Västilä
PHOTOS Alejandra Rodriguez Martinez,
Jukka Lehtiniemi & Sami Takkinen

APPROXIMATELY 1,000 brain tumours are diagnosed in Finland every year. Brain tumours can affect individuals of all age groups, and they are the most significant cause of cancer suffering and mortality among paediatric patients.

University lecturer **Kirsi Granberg** describes how a multidisciplinary brain tumour research programme has been systematically developed in Tampere during the past six years.

“Our research programme brings together clinical, computational, and experimental experts and researchers from the Pirkanmaa Hospital District, Tampere University, and Fimlab laboratories,” says Granberg.

Wide scope of expertise

The research programme is partly built on the previous work of neuropathologist **Hannu Haapasalo** and neurosurgeon **Pauli Helén** who have both been active in brain tumour research for nearly 30 years.

“Our current research is unique in the sense that it is carried out in one place but with a multidisciplinary team,” says bioinformatics professor **Matti Nykter**.

He leads the computational biology research group, which is part of the Academy of Finland Centre of Excellence’s tumour genetics research.

Nykter and Granberg have specialised in exploiting the genome-wide measurement data obtained from patient specimens in their research. The approach typically produces a comprehensive view of tumours, which facilitates a better understanding of tumours and the discovery of suitable drug targets.

Prospective projects are expanding

Brain tumour patients at Tampere University Hospital have been recruited for the prospective brain tumour projects for five years. To date, approximately 400 brain tumour patients have been enrolled in the projects. In addition to brain tumour specimens, blood and cerebrospinal fluid samples are being collected whenever possible. Importantly for patients, the sample collection procedures do not cause any extra harm nor require additional visits to the hospital.

Prospective projects are led by neurosurgeon **Joonas Haapasalo**, paediatrician



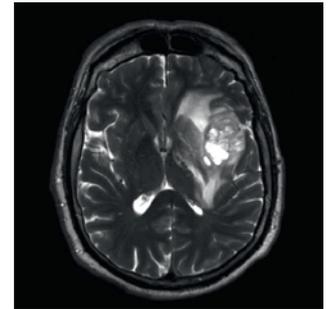
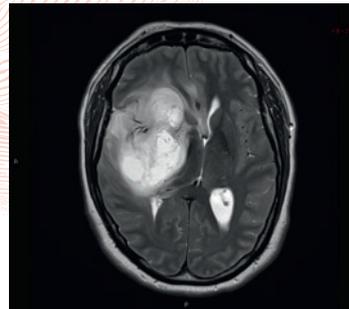
☛ Matti Nykter



☛ Kirsi Granberg



☛ Joonas Haapasalo



☛ Magnetic images of malignant tumours of the brain supporting cells.

Kristiina Nordfors, and neurosurgeon **Minna Rauhala**, together with their respective research nurses.

“Brain tumour specimens are primarily used for diagnosis, and surplus material is used for research. This way we can utilise the samples most efficiently,” says Granberg.

Haapasalo explains that detailed information about treatment efficiency and complications can be obtained when patient prognosis is analysed in the context of detailed treatment information. Furthermore, the information about initial brain tumour symptoms can lead to earlier diagnosis and enhanced direction of patients to proper care.

“Prospective brain tumour projects in Tampere act as a model in the national pilot project of the Finnish Neurocenter. The aim is to recruit all brain tumour patients in Finland into this national project,” he says.

Susceptibility to brain tumours can be inherited

The risk of developing a brain tumour is higher for some patients. Typically, other family members of these patients also suffer from brain tumours. In Tampere, such families are currently analysed to investigate inherited predisposing factors in collaboration with oncologist **Niina Paunu**.

Nykter explains that they perform

genome analyses on a patient’s tumour and blood samples, and combine other data with the results to estimate their significance.

“These data allow us to understand how the patient’s tumour has developed. Cells from a blood sample are used to define what kind of predisposing factors are present in the subject’s genome,” says Nykter.

Towards personalised treatment

There are many different brain tumour types, and each tumour is unique. The research aims at improving personalised treatment options for aggressive tumours.

“Unfortunately, treatment regimens have improved only slightly during the last decades. We strive to strengthen tumour diagnostics and to facilitate the development of new personalised treatment options. We analyse liquid and tissue biopsies as well as investigate the behaviour of cells isolated from the tumour tissue of patients,” explains Granberg.

“One example of personalised treatment options is FGFR3 gene fusion, which we discovered over five years ago,” adds Nykter.

FGFR3 gene fusion is a genomic change, which is present in a subpopulation of aggressive brain tumours. Several

different drugs are currently being tested in clinical trials to treat patients with this genomic change.

There is also a need to develop immunotherapies in a personalised manner.

“We have investigated why a patient’s immune system does not attack the brain tumour and found that the reasons vary from patient to patient. We have also examined which features in tumours are associated with the observed differences,” says Granberg.

The team is currently studying different targets and means of reactivating the immune system in a personalised manner.

The strength of networking

Brain tumour research is demanding and full of challenges. International networking is necessary for seminal new advancements. The key people in the Tampere brain tumour consortium are actively interacting with national and international experts.

Nykter has participated in several international consortia, such as the Cancer Genome Atlas (TCGA) project. Granberg is the president of the Scandinavian Society of Neuro-Oncology and the chairman of Finnish Brain Tumor Research Association (FIBTRA). Haapasalo and Nordfors are currently doing research at the Hospital for Sick Children in Toronto.

“Together we can achieve more,” says Granberg. ✨

Recent years have seen advances in the treatment of ovarian cancer. Improving treatment modalities – such as improved ultra-radical surgery and clinical trials with new drugs – has given hope and better treatment outcomes for patients with ovarian cancer.

TEXT Tuuli Eerola PHOTO Laura Vesa

Teamwork is essential in ovarian cancer treatment and research

EACH YEAR, approximately 500 women in Finland are diagnosed with ovarian cancer. This insidious disease is often symptomless in early stages, and in most patients the disease is diagnosed in the advanced stages.

“Advanced ovarian cancer has a poor prognosis. For successful treatment, every component in treatment needs attention. The first thing is good surgery, for which we have been focusing on so-called ultra-radical surgery in recent years,” says **Annika Auranen**, gynaecologic oncologist and currently Chief Physician at Tays Cancer Centre.

It is typical for ovarian cancer to spread as a disseminated growth on abdominal surfaces. With traditional surgical procedures only a small percentage of patients can be fully de-bulked. Therefore, more extensive operations are increasing in Finland, as elsewhere in the world.

“In ultra-radical surgery, surgical procedures are expanded from gynaecologic organs to other parts of the abdominal cavity, usually to the upper abdomen, peritoneal surfaces and intestines. Increasing the radicality of surgery aims to fully remove all cancerous tissue in the first surgery,” explains **Sami Saarelainen**, gynaecologic oncologist from Tays Cancer Centre, who has been leading the ovarian cancer ultra-radical surgery programme.

Ultra-radical surgery demands resources

At the Tays Cancer Centre, ultra-radical surgeries for patients with advanced ovarian cancer were started in March 2016. Nearly 60 ultra-radical surgeries have been performed during the last three years.

“The demand for these surgeries has increased, so that currently we have reserved a space for this kind of surgery every week,” says Saarelainen.

This extensive operation needs resourcing and tight cooperation between several surgical specialities. The operation team consists of at least two gynaecologic oncologists, an anaesthesiologist, a gastrosurgeon, and sometimes also a thorax surgeon or a surgeon specialised in liver and pancreatic surgery. The complications related to this type of operation exceed complications of traditional, less extensive ovarian cancer surgery.

“Recovery from this type of operation takes longer than from the less invasive surgeries, and is also mentally challenging for the patients. Due to the complication risks, most patients are



↪ Researchers Vesa Hytönen, Daniela Ungureanu, Kalle Savolainen, Synnöve Staff and Annika Auranen

↩ Sami Saarelainen

observed in the intensive care unit immediately after surgery for a day or two," says Saarelainen.

Despite the risks related to ultra-radical surgeries, current evidence favours performing ultra-radical surgeries leading to no residual tumour over less extensive surgeries. A surgical result of "no residual tumour" is the most significant prognostic factor for a patient's survival," says Saarelainen. However, it should be pointed out that correct patient selection for ultra-radical surgeries is essential.

New medical treatments

New treatment options with targeted, immuno-oncological drugs offer the possibility to increase patient survival rates.

"The basic problem with ovarian cancer is that despite well-performed surgery and successfully implemented adjuvant chemotherapy, approximately 70 per cent of patients experience a relapse. Relapses have been traditionally treated with chemotherapy combinations, but eventually the cancer becomes resistant to chemotherapy, and patients experience side effects," says professor **Johanna Mäenpää** from Tays Cancer Centre. She was recently awarded the honour of Clinical Researcher of 2018 in Finland.

Mäenpää and her colleagues at the clinical trial unit are searching for new treatment options to treat this disease.

"We have performed a clinical trial in which a combination of a PARP-inhibitor

and an anti-angiogenic drug (without traditional chemotherapy drugs) was used to treat relapsed ovarian cancer. The results of this trial will be presented this year in a cancer conference in the United States," says Mäenpää.

Immuno-oncological drugs represent another new treatment option that might benefit patients with ovarian cancer. These drugs are currently being investigated in a clinical trial at the Tays Cancer Centre's early phase clinical trial unit FONK. With immuno-oncological treatments, the aim is to help patients' immune systems fight against cancer cells.

Tays Cancer Centre has traditionally been strong in performing clinical trials with gynaecological cancer patients. Currently, the number of on-going clinical trials for ovarian cancer patients at Tays Cancer Centre by far exceeds the number of trials in any other Finnish university hospital. This means that the patients are at the frontline to receive drugs not yet clinically available.

"I am optimistic that we can eventually improve survival rates for ovarian cancer," says professor Mäenpää, who has extensive experience treating ovarian cancer patients.

Translational research is needed for new innovations

An ovarian cancer translational research project with a prospective patient sample collection started in 2016, with Annika

Auranen as the principal investigator. The project addresses several research questions. One of these is headed by Academy of Finland scientist **Daniela Ungureanu**, who establishes cell cultures from patients and investigates the ROR signalling network.

"By studying cell signalling, we try to increase our understanding of the mechanisms of chemo resistance," says Ungureanu.

Ungureanu is happy with the close co-operation that has been created at Tays Cancer Centre between clinicians treating ovarian cancer and scientists at the University laboratories. She hopes that the fruitful collaboration encourages future scientific generations to undertake top-level research.

Quality of life matters

Despite recent advances in treatment only half of patients with ovarian cancer live longer than 5 years from diagnosis. For many patients, ovarian cancer is an incurable disease. Good palliative care is fundamentally important.

"We have been fortunate that our own doctors have wanted to improve their skills in palliative care. One of our gynaecologic oncologists, **Päivi Rovio**, has undergone extensive training and is receiving competence in palliative care this spring. It is a big help for our patients to receive specialist palliative care in our own unit," says Annika Auranen. ✨

Nursing science focus on continuous development

Tays Cancer Centre features state-of-the-art practices in nursing science in Finland.

THE AIM OF RESEARCH in nursing science is to produce knowledge that can be used to develop nursing and improve people's health.

"We are continuously and systematically developing our work through education, scientific research, and student projects," says Tays Cancer Centre's director of nursing **Kaija Leino**.

Staff members of the Cancer Centre have produced several doctoral theses, as well as student projects at the University of Applied Sciences that have focused on nursing among different cancer patient groups. Currently, nursing research is actively focusing on prostate cancer patients. Previously, many research projects on breast cancer patients have been conducted.

"Our research projects are often multidisciplinary and they include members from different backgrounds like oncologists and psychologists, in addition to nursing scientists," says professor **Marja Kaunonen** from Tampere University.

"In addition, we are collaborating with representatives of patient organisations. The collaboration with these organisations has been on-going for a long time and we have focused on supporting patients and improving their quality of life," says Kaunonen.

Systematic staff education

Nurses at Tays Cancer Centre have conducted diverse courses specialising in cancer care and palliative nursing.

"Many of our nurses have conducted courses and studies in further education, for example, on cancer patients' multi-professional care continuity or paediatric oncological care," says Leino.

Last year Tays personnel conducted courses, for example, on psychotherapeutic support of seriously ill patients.

The Cancer Centre has been participating in the Pirkanmaa Hospital District's research and development programme, which will continue until the year 2020. It focuses on the participation of cancer patients and their significant others in cancer care, as well as on the relationships between patients and nurses.

"We have also developed internet-based support

services for cancer patients and their families. This kind of support can be very diverse, like sharing information," says Kaunonen.

The use of nursing instruments will expand

We have put effort into the development and implementation of nursing instruments.

"We have already used a national 'nurse sensitive' survey for cancer patients for a couple of years. It is used to measure patients' opinions on the nursing and cancer care that they have received. Next, we are going to expand its use for patients of gastro surgical, urological, and gynaecological cancers," says Leino. ✱

What are the research topics of nursing science?

Nursing science is an independent discipline that belongs to health sciences. At Tampere University, the research focuses on family health, patients and their families, as well as on the leadership of health care and management, and health care education.

Multidisciplinary research

In the year 2018, PhD Eeva Harju's doctoral dissertation focused on the health-related quality of life and marital relationships between prostate cancer patients and their spouses. At the moment, a doctoral study on the side effects of gynaecological cancer treatments and their association with women's activities in their daily lives is being conducted. In addition, a student from the University of Applied Sciences will shortly finish her research project on the role of a cancer medication checklist in patient education. There has also been research collaboration with the Cancer Society of Finland that focuses on electronic guidelines for cancer patients, their needs for this kind of guidance and its availability for patients.

A man in a dark blue long-sleeved shirt with a white graphic and dark pants is raking yellow and orange autumn leaves into a metal wheelbarrow. He is wearing red and black Adidas sneakers. The scene is outdoors on a gravel path, with a stone building and trees with vibrant autumn foliage in the background. The lighting is bright, suggesting a sunny day.

Life is a lottery

Only ten per cent of lung cancer patients do not smoke. Ismo Niemi from Kangasala is one of them.



ISMO NIEMI CELEBRATED his birthday by attending a concert the day before he had a doctor's appointment to check out a cough he'd had for close to a year.

"My wife was worried and asked me to go and see a doctor," says Niemi. "So I went."

A lung X-ray was taken and the doctor told him that more examinations were needed. In the Acuta emergency unit, they carried out further examinations and the picture became clearer.

"The cancer diagnosis was confirmed by an endoscopy. It was a total surprise to me because I have never smoked. The doctor told me that life is a lottery and I got a bad hand," says Niemi.

Malignant tissue removed by surgery

Niemi is pleased that the doctor immediately told him the truth, rather than dancing around the topic.

Chemotherapy was started in three-week intervals for three months. The drugs made him exhausted and he went on a sick leave.

The treatment was effective and the tumour decreased. Eventually, the doctor opted for surgery.

"I asked the surgeon to cut out everything that might negatively impact my health. My whole lung was removed in surgery," says Niemi.

A sporty man, Niemi started to walk in the corridors of the hospital as soon as he was allowed to get up from bed. At the end of his six-day hospital stay, he walked 1,2 kilometres in one go.

Patient participates in decision-making

It has been two years since Niemi received his diagnosis. Stiff and sensitive feet are now a constant reminder of the chemotherapy that affected his peripheral nervous system. His work as a physiotherapist has been replaced by a disability pension.

"I go for check-ups and laboratory tests every three to four months. Fortunately, they have not found anything in my CT scans. The whole time, I have received excellent medical treatment and up-to-date information," says Niemi. ✱

Ismo's treatment path

NOVEMBER–DECEMBER 2016

Niemi goes to see a doctor about his prolonged cough. Lung x-rays are taken. Basic research and computerised lung imaging are done at Tays Emergency Department Acuta. There is a bronchoconstriction in front. Niemi goes to see a specialist in lung disease.

NEW YEAR 2017

Tissue samples are taken from the lungs. Diagnosis: It's lung cancer.

FEBRUARY–MAY 2017

Niemi receives a three-month cytostatic regimen. The cancer starts to shrink.

JULY 2017

One of the lungs is operated on.

FOLLOW-UP CARE

Niemi receives blood thinning and pain relief treatment. Control and laboratory tests are scheduled for every three to four months for two years. The cancer has not recurred.

A portrait of a woman with long, dark, wavy hair, wearing a dark green top and a necklace. She is looking directly at the camera with a slight smile. The background is blurred green foliage.

Active quality management benefits everybody

At Tays Cancer Centre, quality work means shared commitment, doing things together, and common “ground rules” for processes.

TEXT Tuuli Eerola PHOTO Eino Ansio

QUALITY MANAGEMENT is essential in health care processes. Without quality management, consistency and excellence in performance cannot be maintained. At Tays Cancer Centre, quality director **Sari-Marja Hytönen** is responsible for quality management. Prior to joining Tays, she has gained extensive experience of quality management at the university hospital. According to Hytönen, quality management consists of planning, improving and controlling various processes with a systematic approach.

Key performance indicators at Tays Cancer Centre include, for example, access to treatment, patient-centeredness, patient satisfaction, patient safety, and care according to guidelines.

“Quality has always been one of the key elements in our university hospital when developing processes, but after the formation of Tays Cancer Centre, quality management relating to cancer processes has become more systematic. It now unifies all units treating cancer patients to similar processes and discussions about quality,” says Hytönen.

Clinical Quality Group

In spring 2018, we formed a clinical quality group, which includes key people from each cancer pathway and each discipline that participates in the treatment of a specific cancer, says Hytönen. For example, the lung cancer pathway is represented in the clinical quality group by a pulmonologist, a thorax surgeon, a medical oncologist, a radiation oncologist, and a responsible nurse. The clinical quality group is chaired by Hytönen and oncologist **Maarit Bärlund**. The group had five meetings in 2018, and the first issues to be discussed and standardised were updating instructions and guidelines, standardising the multidisciplinary tumour board (MDT) process, and forming shared practices for entering data and codes into the electronic patient information management system. The last issue is important for producing comparable data for following waiting times for treatment, for example.

“Tays is a large university hospital. On the hospital intranet, we have created the Tays Cancer Centre intranet web page where we have collected links to instructions and guidelines related to cancer care. This helps our professionals to find instructions quickly and easily,” says Hytönen.

Multidisciplinary tumour boards

The biggest project in 2018 has been the standardisation of the MDT process. In the lung cancer pathway, for example, the MDT process was developed by a group that consists of a radiologist, pathologist, thorax

surgeon, oncologist, and a nurse.

“The goal is that each cancer patient is discussed in the MDT board at least once,” says Hytönen. A newly updated guide to the MDT process created by Hytönen and Bärlund is now available on the hospital intranet for everybody to see.

Multidisciplinary tumour boards are important for patients as well.

“When we interviewed patients, we found out that they felt safe and secure knowing that their situation was discussed by a larger team of professionals, and treatment decisions were made in a bigger group,” says Hytönen.

A central person in the quality management work done in Tays Cancer Centre is director of nursing **Kaija Leino**, who is responsible for the education and training of nurses.

“Quality management at Tays Cancer Centre is, above all, about doing things together. We are a big group of committed people doing daily work for the best of the patients,” says Hytönen. ✱

On-going Quality processes:

- Most recent cancer-specific pathways and guidelines: The lung cancer patient pathway has been finalised, and the colorectal cancer patient and gynaecological cancer pathways have been updated.
- Primary health care patient pathways: Breast cancer and lung cancer.
- Improving patient-centeredness according to suggestions from the Tays Cancer Centre Patient Forum.
- Different quality registries used in the hospital have been assessed. Finding ways to report quality is one of the tasks for 2019.
- A booklet for patients coming who will undergo colorectal surgery will soon be available digitally in OmaTays, the digital patient application.
- Following safety risks (HaiPros) specifically related to cancer care.
- Self-assessment and internal audits of our processes.

2018 in numbers

New cancer patients

5 165

Cancer patients treated in the centre

16 993

Out-patient visits

93 974

Patients receiving radiotherapy

2 256

Radiotherapy sessions

34 363

Cancer researchers

> 400

Access to treatment at the Oncology Department in 28 days

> 99 %

Primary cancer surgeries

> 2 200

Given oncological drug doses

32 053

Expenses of oncology drugs

20.03 milj. €

On-going clinical trials

80

Cancer publications

202

Cumulative impact factors
2014–2018



Cancer Research:
International collaboration networks



Highlights of the year 2018

THE REGIONAL CANCER CENTRE, FICAN Mid, was founded on May 8, 2018 when Pirkanmaa hospital district, the University of Tampere, Etelä-Pohjanmaa hospital district and Kanta-Häme hospital district signed the charter. The director of FICAN Mid is **Annika Auranen**, chief physician, MD, PhD, and docent. Tays Cancer Centre is a crucial part and active operator of the regional cancer centre.

PROFESSOR Johanna Mäenpää, MD, PhD, was chosen as Clinical Researcher of the Year 2018 in Finland. Clinical researchers in Finland nominated Mäenpää, who has been described as an excellent principal investigator. Professor Mäenpää works both at the University of Tampere and the Tampere University Hospital.

An early stage (phase I-II) cancer medication research unit (FONK) is an important part of the clinical cancer research at Tampere University Hospital. The Fonk was accepted as a member of NordicNECT in April 2018. Department of Oncology of Tampere University Hospital was selected as an INSPIRE Site as part of Pfizer's Investigator Networks, Site Partnerships and Infrastructure for Research Excellence program in the summer 2018. Tampere University Hospital is the first university hospital in Finland that has been selected as an INSPIRE-site.

THE PERSONNEL of Tays Cancer Centre were crucial organisers of the event Syövänhoidon Mallimaa 2020 (Model country of cancer care 2020) in Tampere on October 15, 2018. The event was part of the activities of the National Cancer Center Finland network. The theme of the event was clinical trials.

THE CANCER CENTRE exhibited its work at the annual Research Day seminar in Tampere on November 23, 2018.



JUKKA LEHTINEN



Johanna Mäenpää

KIRSI KAUSE

Some examples of publications:

Annala M, Vandekerckhove G, Khalaf D, Taavitsainen S, Beja K, Warner, Evan W, Sunderland K, Kollmannsberger C, Eigl BJ. Circulating Tumor DNA Genomics Correlate with Resistance to Abiraterone and Enzalutamide in Prostate Cancer. *Cancer Discovery* 8: 444–457, 2018.

Hammarén HM, Virtanen AT, Abraham BG, Peussa H, Hubbard SR, Silvennoinen O. Janus kinase 2 activation mechanisms revealed by analysis of suppressing mutations. *J Allergy Clin Immunol*, 2018. pii: S0091-6749(18)31129-1.

Latonen L, Afyounian E, Jylhä A, Nättinen J, Aapola U, Annala M, Kivinummi KK, Tammela TTL, Beuerman **RW**, **Uusitalo H, Nykter M, Visakorpi T.** Integrative proteomics in prostate cancer uncovers robustness against genomic and transcriptomic aberrations during disease progression. *Nat Commun.* 9(1)1176, 2018.

Murtola TJ, Syväälä H, Tolonen T, Helminen M, Riikonen J, Koskimäki J, Pakarainen T, Kaipia A, Isotalo T, Kujala P, Tammela TLJ. Atorvastatin Versus Placebo for Prostate Cancer Before Radical Prostatectomy – A Randomized, Double-blind, Placebo-controlled Clinical Trial. *Eur Urol.* 74(6):697–701, 2018.



Tays Cancer Centre

www.tays.fi/tamcan

Tampere University Hospital (Tays)

PO BOX 2000, FI-33521 TAMPERE, Finland
Visiting address: Teiskontie 35, Tampere
Tel. +358 3 311 611

Tampere University

Faculty of Medicine and Health Technology
PO BOX 100, FI-33014 TAMPERE UNIVERSITY,
Finland
Visiting address:
Arvo Ylpön katu 34 (Arvo-building), Tampere
Tel. +358 3 355 111

**Tampere University of Applied Sciences
(TAMK)**

Kuntokatu 3, FI-33520 Tampere, Finland



Texts and layout:

Otavamedia OMA
yriyksille.otavamedia.fi

Cover image:

Roope Permanto

