Research

2025 Impact Report
Danish Cancer Society

Throughout the report, we present a number of charts analysing both the research funding awarded by the Danish Cancer Society and the funding received by the Danish Cancer Institute. Grants awarded by the Danish Cancer Society for campaigns, awareness-raising initiatives, research talent awards, the Nordic Cancer Union, the Children's Cancer Foundation and short-term travel grants are not included in the charts. Figures and charts in this report may be rounded to the nearest whole number.

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The Danish Cancer Society pursues a three-track strategy for supporting research: independent research, strategic research and the Danish Cancer Institute (DCI). This annual impact report comprises research supported through all three tracks. The Danish Cancer Society awards research funding through independent committees composed of both experts and patient representatives. Researchers at DCI apply for funding on equal terms with external researchers.

Danish Cancer Society Research

Research is one of the Danish Cancer Society's main areas of focus, and we are proud that our support helps improve treatment and care for cancer patients year on year. In 2025, our contributions included new insights into how patients can be better prepared for treatment, new results in radiation therapy using particle therapy and basic research that deepens our understanding of the biology of our cells.

Everyone affected by cancer benefits from the progress made through research. Step by step, new knowledge moves us forward and ensures continued progress. Many years of dedicated effort mean that the focus today is not only on developing new treatments to ensure survival. There is also a focus on life during and after cancer. In this area, basic research – including knowledge about genetics – has led to major advances. Several of the research projects presented in this report therefore focus on basic research that may contribute to improved treatments. One example is research that provides a new understanding of the biology behind a particular type of breast cancer medicine.

Studies show that targeted efforts before cancer treatment can in many cases strengthen patients' prospects of getting through treatment successfully. Examples include improving physical fitness or optimising diet through so-called prehabilitation. These efforts can help patients cope better with treatment and in some cases enable life-saving treatment that they would otherwise not have been able to tolerate. Prehabilitation is part of the new Cancer Plan V, adopted in 2025, and the Danish Cancer Society has supported several projects examining which prehabilitation interventions are most effective. Another area that is becoming increasingly important for both patients and their relatives is life after cancer. Fortunately, more and more people survive cancer, but many experience late effects of the disease and its treatment. A daily life marked by pain, overwhelming fatigue or bowel control problems can place a significant brake on life. For many years, the Danish Cancer Society has supported research into late effects, and in 2018 three national centres dedicated to research on late effects were established with support from the Knæk Cancer fundraising campaign. The research has helped map the scale of the problem, identified solutions and raised political awareness. Late effects after cancer are now part of the political agenda and feature as a key priority area in Cancer Plan V. The plan establishes that people who have had cancer should be offered help for late effects, and that dedicated late-effects clinics will be established in all Danish regions. This is an important and tangible step forward for the many people who need support in adjusting to a fundamentally new everyday life. In line with this, a broad group of professionals – at the initiative of the national research centres for late effects – developed new clinical guidelines in 2025 for the treatment of the five most common general late effects. These guidelines provide a foundation for ensuring consistent and optimal treatment across Denmark.

In the 2025 Impact Report, we present a broad selection of projects launched during the year as well as projects that have progressed far enough this year to produce results.

We hope you enjoy reading it.

Mads Melbye
Research Director

Jesper Fisker
Managing Director

Danish Cancer Institute

At the Danish Cancer Institute (DCI), 378 researchers from 30 different nationalities are working to advance cancer research. DCI works across a broad range of areas, from basic research in biology and data to advanced computational models and clinical trials testing new knowledge.

It is impossible to predict when or where the next major advance in cancer treatment will come from. A good example is the development of the CRISPR genetic scissors. What began as curiosity about some unexplained, repetitive DNA sequences in the bacterium *E. coli* led, 25 years later, to a technique that has both earned a Nobel Prize and revolutionised research in genetics and gene therapy. This story illustrates why strong basic research matters. It is here that the seeds of future treatments are sown.

It can be difficult to imagine the potential when researchers passionately set out to study a gene or a protein inside the cell. In some cases, these efforts lead only to one more piece in the puzzle of understanding how our cells work. But at some point, all this new knowledge can come together and lead to a genuine breakthrough. You simply never know when or where. This serves as a useful reminder of the value of daring to invest in research that may be difficult to understand and does not immediately appear to be leading to a tangible result, such as a new treatment. Even if, as the example of CRISPR shows, it can take time.

In 2025, Denmark's first basic research centre for epigenetic cell memory opened at the Danish Cancer Institute. Epigenetics is the study of how chemical changes – caused, for example, by our lifestyle – can switch genes on or off. This is a mechanism that is frequently disrupted in cancer. The field adds an entirely new dimension to our understanding of cells and genetics. While complex, it also holds considerable potential to make a difference in the development of future cancer treatments.

DCI is, of course, also home to many other branches of cancer research. Some of DCI's researchers work with computers and artificial intelligence. In 2025, this led to the development of a new gene lexicon for cancer. The lexicon helps doctors select the best treatment for patients with a change in the BRCA2 gene (see p. 29). Other researchers conduct clinical trials by combining large volumes of registry data. Their results this year have been so groundbreaking that they will change the clinical guidelines for the treatment of blood cancer (see p. 32). And others still have used statistics and modelling to predict a future increase in the number of older women with breast cancer in Denmark – knowledge that can help the healthcare system prepare for the specific needs of this group of patients (see p. 34). All of this and much more can be found on the following pages, where you can follow the researchers' work and learn more about some of the many advances made during the year.

2025

2021

Partners

Collaboration at national and international level is crucial for the research conducted at the Danish Cancer Institute. The figure shows the research institutions that have published most joint research publications with DCI in the period 2021-2025.

Finances

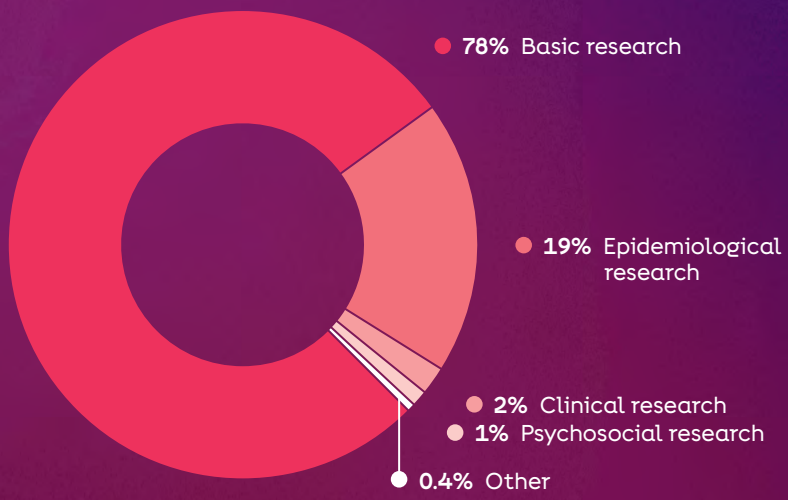
The aggregate financial statements for the Danish Cancer Institute show expenses of DKK 257.6 million in 2025, of which basic funding from the Danish Cancer Society amounted to DKK 93 million for payroll and operating expenses and DKK 52.9 million for fundamental costs.

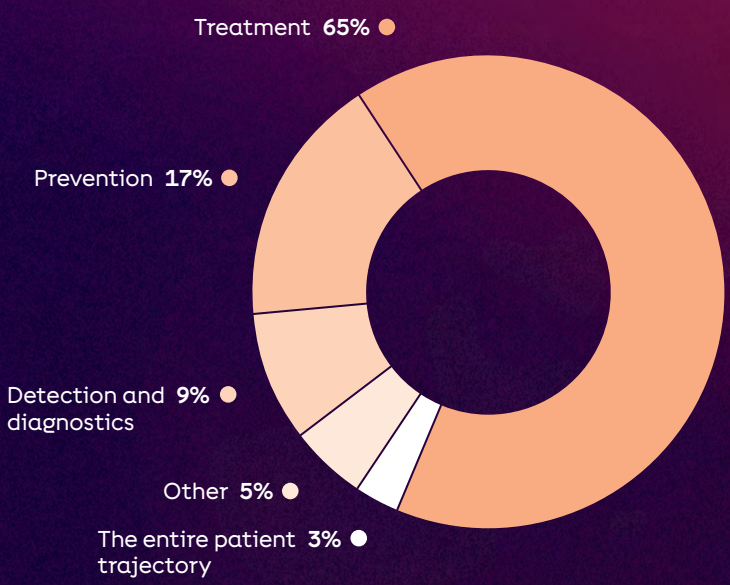
During 2025, researchers at DCI also received research grant pledges totalling DKK 216.4 million from a large number of foundations. The money will be used to fund research projects in the coming years.

Learn more about the finances and see financial statements for the Danish Cancer Society as a whole on **cancer.dk**.

Research areas

The chart shows the grants allocated to DCI in 2025, distributed by research area. It includes funding applied for in open calls, strategic funds and external foundations. The category 'Other' includes research such as qualitative and multi-field research.





Patient trajectory focus

The chart shows the grants allocated to DCI in 2025, distributed in relation to patient trajectory focus. It includes funding applied for in open calls, strategic funds and external foundations. The category 'Other' includes focus areas such as late effects and rehabilitation.

RESULT FROM 2025

Cancer cells protect themselves against death

"It is not necessarily about developing a new drug from scratch, but about using our knowledge to improve existing treatments.

Marja Jäättelä
Group leader
Cell Death and Metabolism research group

Researchers have identified a previously unknown mechanism that ensures cell survival. The discovery may have implications for future cancer treatment.

Lysosomes are small organelles filled with acid and enzymes that perform a number of vital functions in our cells. Among other things, they act as a kind of caretaker, ensuring that cellular waste is broken down, and they play an important role in ensuring that cell division proceeds correctly. Lysosomes depend on their ability to both store and release calcium to function properly. In 2025, the Cell Death and Metabolism research group showed that the protein TMEM165 plays a crucial role in regulating both calcium and several other important ions in lysosomes, including hydrogen ions (protons). Lysosomes are separated from the rest of the cell and can in this way function as a kind of reservoir for calcium and protons. Too much calcium outside the lysosomes kills the cell, which is why careful regulation of its concentration is important.

– This is a truly fundamental question about how cells function, and we have now found the answer. This knowledge is relevant, for example in relation to drugs that disrupt ion homeostasis and can therefore be effective against cancer, says Professor and group leader Marja Jäättelä from the Cell Death and Metabolism research group, who led the study. The study was published in the acknowledged scientific journal Nature Communications. The research shows that TMEM165 acts as a kind of dual transporter, helping to remove excess calcium from cells by pumping it into the lysosomes in exchange for hydrogen ions. This is a vital function for cells, as too much calcium within the cell can be lethal. When cells are overloaded with calcium – for example in connection with certain drugs or stress – TMEM165 helps pump it into the lysosomes, where it is stored. This restores balance in the cell, allowing it to survive.

– This mechanism acts as a kind of safety valve for cells, and if it fails, cells become far more vulnerable to dying. This is particularly true of cancer cells, which often already have impaired ion regulation, explains Marja Jäättelä.

The discovery could have significant implications for cancer treatment, as the study showed that cancer cells without TMEM165 are markedly more sensitive to certain types of compounds. This includes allergy medicines such as antihistamines and other drugs that have been shown to kill cancer cells by disrupting lysosomal function. According to the researchers, this knowledge opens up the possibility of targeting the survival mechanisms of cancer cells and perhaps combining TMEM165 inhibitors with existing cancer drugs to increase their effectiveness. The new research also changes the fundamental understanding of how lysosomes function. Channels that pump calcium out of lysosomes have long been known, but until now it has not been understood how lysosomes are refilled.

– We have long suspected that such a mechanism must exist in humans, but only now have we been able to demonstrate it, says Marja Jäättelä.

Although there is still a long way from the laboratory to the patient, the researchers believe that TMEM165 could become an important target for new cancer treatments. Particularly in combination with drugs that stress the calcium balance of cancer cells, it may be possible to tailor more precise and potent treatments with fewer side effects.

– It is not necessarily about developing a new drug from scratch, but about using our knowledge to improve existing treatments, says Marja Jäättelä.

The results are published here:
Chen R. et al.: Lysosomal TMEM165 controls cellular ion homeostasis and survival by mediating lysosomal Ca2+ import and H+ efflux. Nat Commun. 2025, Jun 5. DOI: 10.1038/s41467-025-60349-5.

The Danish Cancer Society supports research

The project 'Lysosomal leakage – more than a cellular suicide mechanism' received DKK 4,050,000 from the Danish Cancer Society Scientific Committee in 2020.
The project 'Lysosomal control of cellular ion homeostasis' received DKK 3,900,000 from the Danish Cancer Society Scientific Committee – Biology & Clinic in 2023.

NEW PROJECT FROM 2025

Pregnancy complications in women who had cancer as children

A new study aims to provide insights into pregnancy outcomes among women who had cancer as children. The study examines the risk of complications during pregnancy and childbirth, and aims to help ensure better pregnancies for both mother and child.

Today, most children with cancer survive, but many experience late effects that can have an impact when they later become pregnant. A new research project therefore aims to generate more knowledge that can help both parents and newborns:

– We still know too little about the complications childhood cancer survivors may face during pregnancy. Our goal is to be able to answer some of the questions and concerns that parents often have, and perhaps also to prevent some of the possible problems, says senior researcher Line Kenborg from the Hematology research group, who is leading the study.

When cancer occurred decades earlier in life, questions about fertility and pregnancy can easily be overlooked. However, previous research suggests that female childhood cancer survivors may have greater difficulty becoming pregnant and are more likely to develop high blood pressure during pregnancy, which can affect both mother and child. The new study therefore examines both the health of newborns and pregnancy complications such as the occurrence of pre-eclampsia and caesarean sections. The study includes 13,500 female cancer survivors from Denmark, Finland and Sweden and began in January 2026.

"Our goal is to be able to answer some of the questions and concerns that parents often have, and perhaps also to prevent some of the possible problems

Line Kenborg
Senior researcher

KR

The Danish Cancer Society supports research

The project 'Pregnancy, delivery and newborn complications in female childhood cancer survivors' received DKK 1,630,000 from the Danish Cancer Society's Scientific Committee – People & Society in 2025.

RESULT FROM 2025

Parents' background influences children's cancer survival

Children of non-Western immigrants are less likely to survive cancer. This is shown by a study from the Cancer Survivorship research group, which also points to a tendency for these children to face a greater risk of relapse.

Today, more children survive cancer because treatment has improved significantly over recent decades. This is due in part to better opportunities for early diagnosis and treatment. However, these advances have not benefited all children and families equally. A study from the Cancer Survivorship research group showed in 2025 that children in Denmark are less likely to survive cancer if their parents come from a non-Western country than if they come from Denmark or another Western country. The study shows that children of non-Western parents had a 44% higher risk of dying from their cancer within five years of diagnosis. For certain cancers, survival rates were only half as high. Fortunately, cancer in children is relatively rare. Each year, around 280 children in Denmark are diagnosed with cancer, yet cancer remains the leading cause of death from disease among children.

– In a country like Denmark, where everyone has equal access to the same healthcare services, it is striking that we see this difference. It suggests that there is a systematic issue that needs to be addressed. The results point to the broader inequality that we unfortunately already know exists in the healthcare system, and which we must and should change for all cancer patients, says Professor Susanne Dalton.

She leads the Cancer Survivorship research group and is director of the Danish Research Center for Equality in Cancer (COMPAS). Being Denmark's leading expert on social inequality, she also contributed to the new study.

The study also shows a clear tendency for children of parents with a non-Western background to have a greater risk of relapse than children whose parents were born in Denmark. The pattern of poorer survival and a tendency towards a greater risk of relapse also appears to apply when parents have a weak attachment to the labour market, for example if they are unemployed or entirely outside the workforce.

– Taken together, the results paint a picture of some families being more vulnerable and needing additional support throughout a child's cancer trajectory, says PhD student Fie Stegenborg, who carried out the research together with Mathilde Bek.

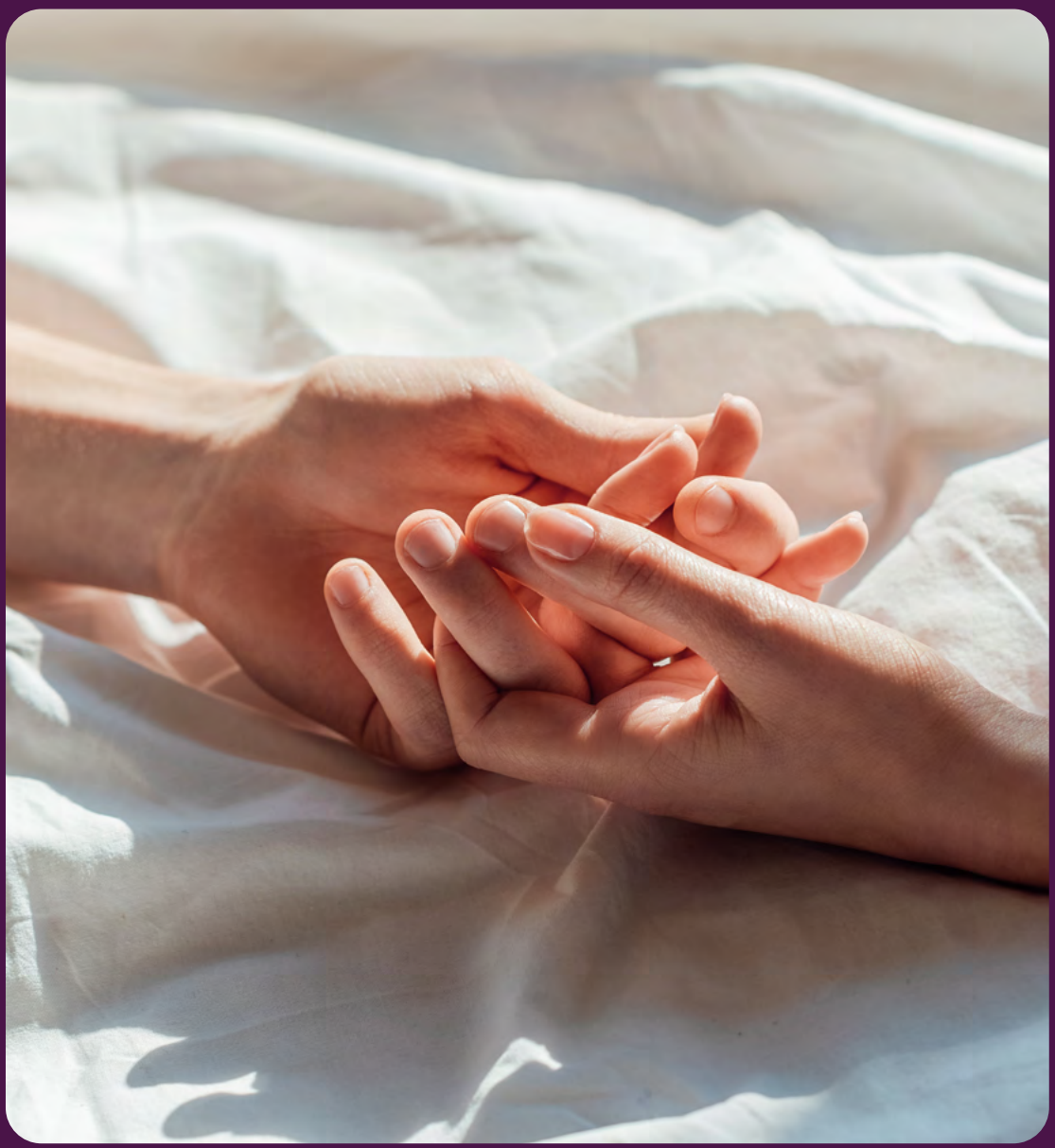
The study reflects the broader inequality in the healthcare system, says inequality expert Professor **Susanne Dalton**, who contributed to the research.

The Danish Cancer Society supports research

The new study was conducted by the Cancer Survivorship research group at the Danish Cancer Institute in collaboration with doctors and nurses from the Department of Paediatric Haematology and Oncology at Rigshospitalet in Copenhagen, which treats children with cancer.

The project is supported by the Danish Cancer Society, the Children's Cancer Foundation and the Danish National Research Centre for Childhood Cancer (CONTROL), which was established with funding of DKK 25 million from the Knæk Cancer fundraising campaign in 2019.

The results are published here: *Stegenborg F. et al.: Socioeconomic characteristics and relapse-free and overall survival from childhood cancer – a nationwide study based on data from the Danish Childhood Cancer Registry. Acta Oncol. 2025, Jan 29. DOI: 10.2340/1651-226X.2025.42131.*



RESULT FROM 2025

Large Danish study:

More people than expected experience sexual problems after cancer

Many people struggle with serious and long-lasting sexual late effects after cancer. This applies regardless of gender, age, when they had cancer or the type of cancer they had.

Pernille Bidstrup

Cecilie Madsen

Pain in the genital area, erectile dysfunction and loss of sexual desire are among the sexual late effects that many people live with after cancer. Sexual late effects are among the most burdensome consequences, often more so than physical pain and cognitive difficulties. Researchers have therefore mapped the extent of sexual late effects. The work was carried out by the Psychological Aspects of Cancer team from the Cancer Survivorship research group, in collaboration with researchers behind the Project SEXUS cohort study. They used data from more than 4,000 Danes aged 15–89 who have had cancer, and compared them with more than 58,000 people without cancer. The conclusion is that both men and women more frequently experience sexual late effects after cancer compared with people who have not had cancer. These late effects are seen regardless of cancer type and age and often persist for many years after treatment has ended.

Two of the most common sexual late effects are pain in the genital area in women and erectile dysfunction in men. Women who have had cancer have 1.74 times higher odds of experiencing pain in the genital area compared with women who have not had cancer. For men, the likelihood of erectile problems is almost three times higher. The study also shows that women who have had cancer are 1.2 times more likely to be sexually inactive than women without cancer, compared with 1.7 times among men. The study provides the most detailed picture to date of how cancer and cancer treatment can affect people's sexuality. The study showed that these problems also occur after other cancers, such as melanoma and cancers of the respiratory system.

– This underlines how important it is for healthcare professionals to recognise and address sexual challenges after cancer, regardless of cancer type, says medical doctor and PhD student Cecilie Madsen, who is the first author of the study.

Many people with cancer would like to talk with healthcare professionals about sex and intimacy. However, doctors and nurses often find it difficult to initiate the conversation, partly out of concern about overstepping the patient's boundaries. This can leave patients with unnecessary worries and a sense of loneliness. This needs to change, believes psychologist Pernille Bidstrup, PhD and team leader of the Psychological Aspects of Cancer team.

> "Sexual health and well-being are very important for quality of life, and we must take this seriously
>
> **Pernille Bidstrup**
> PhD and team leader Psychological Aspects of Cancer.

– Sexual health and well-being are very important for quality of life, and we must take this seriously. Our results clearly show that this is a widespread problem in Denmark among people who have had cancer, and it calls for Danish solutions, says Pernille Bidstrup.

To address this, researchers have developed a training programme to help healthcare professionals initiate conversations with patients about sexual health. So far, the training has been piloted at Rigshospitalet, and the researchers are currently evaluating the programme.

The Danish Cancer Society supports research

The project 'MOVING CLOSER. Sexuality and intimacy after cancer' received DKK 1,540,000 from the Danish Cancer Society Scientific Committee – People & Society in 2021. The study is conducted at the Danish Cancer Institute in collaboration with Statens Serum Institut and Aalborg University. It builds on data from the Project SEXUS cohort study.

The results are published here: *Madsen CH. et al.: Sexual health among Danish cancer survivors and individuals with no history of cancer: Baseline findings from the nationwide Project SEXUS cohort study. Cancer. 2025, Sep 15. DOI: 10.1002/cncr.70074.*

RESULT FROM 2025

Nitrate in drinking water linked to colorectal cancer

Dorit W. Erichsen

Results from the Diet, Cancer and Health research group point to an increased risk of colorectal cancer even below the current limit values. The study is based on data from more than 52,000 Danes who have participated in the Diet, Cancer and Health cohort study.

Nitrate in drinking water has for several years been suspected of being harmful to health, and Danish registry-based research has previously pointed to a possible link with an increased risk of colorectal cancer. In 2025, a new and more detailed population-based study from the Diet, Cancer and Health research group supported these earlier findings and showed that high levels of nitrate in drinking water are associated with an increased risk of developing colorectal cancer. In Denmark and the EU, the limit value for nitrate in groundwater and drinking water is 50 mg/l, in line with recommendations from the World Health Organization (WHO). However, the new study corroborates the association found in the earlier study between nitrate in drinking water and the risk of colorectal cancer at levels as low as 9.25 mg/l.

– The results support what colleagues found in the earlier Danish study – that there is an association between the amount of nitrate in drinking water, even below the limit value, and an increased risk of colorectal cancer, says PhD student Dorit W. Erichsen, who led the new study.

She emphasises that the results must be seen in relation to the overall risk of colorectal cancer.

– Our research shows that the risk is increased, but it is important to remember that other risk factors also affect the likelihood of developing the disease. Diet, obesity and smoking also play a role, she says.

Using measurements from waterworks, the researchers in the new study estimated how much nitrate each participant had consumed through drinking water in their homes over several decades. The study also includes extensive information on participants' lifestyles, which may influence the development of cancer. This makes the new results more robust than previous research.

Lifestyle may play a role

While nitrate is not harmful in itself, it can be converted in the body into nitrite and carcinogenic substances called nitrosamines. Laboratory studies have shown that the conversion from nitrate to nitrosamines can be influenced by other factors. For example, antioxidants such as vitamins C and E from vegetables and fruit can inhibit the process, whereas substances in tobacco and red meat may increase the conversion.

– In line with what we know from animal and laboratory studies, we demonstrated that certain lifestyle factors could reduce or increase the effect of nitrate from drinking water. For example, there were indications that the risk was higher for people who smoked or ate a lot of red meat, and lower for people who ate a lot of vegetables, says Dorit W. Erichsen.

– If you minimise your intake of meat, avoid smoking and eat plenty of vegetables, you give your health the best possible conditions, both in general and specifically in relation to the findings of this study, she says.

Despite the new study, the researchers still believe that water remains one of the best ways to quench your thirst.

– Tap water remains one of the healthiest and most environmentally friendly choices, says Dorit W. Erichsen.

The results are published here:
Erichsen DW. et al.: Source-specific nitrate and nitrite intake and association with colorectal cancer in the Danish Diet, Cancer and Health Cohort. Environ Int. 2025, Aug. DOI: 10.1016/j.envint.2025.109658. Epub 2025 Jul 3.

MENTORING PROGRAMME
for scientists

When young researchers complete their doctoral training, many choose to continue their careers in private companies. However, the transition from academic research to the private sector can be challenging.

The career change requires an understanding of how research competencies can be applied in a different setting and a different way of thinking about problem-solving and collaboration. To support this transition, the Danish Cancer Institute has established a new mentoring programme to help young researchers navigate the move. Participants are matched with a mentor from a relevant professional field in a confidential one-to-one mentoring programme. The mentor provides participants with unique insight into their field and advises them on career choices, skills development and personal focus. This helps participants better understand how their research skills can be translated and applied in other types of roles. At the same time, the programme strengthens researchers' interdisciplinary competencies, such as communication, collaboration and an understanding of what it takes to work in environments with different values and goals. In some cases, it even creates networks that can open doors to the next job. This year, most mentors have been alumni from the Danish Cancer Institute who remember the challenges of the transition themselves and want to help younger researchers move forward in their careers.

NEW PHD & RESULT FROM 2025

Aikaterini works with mini-tumours to improve treatment for ovarian cancer

In 2025, Aikaterini Skorda defended her PhD at the Danish Cancer Institute. Her research holds promising potential for improving treatment.

Over four years, Aikaterini Skorda studied ovarian cancer as part of her PhD in the Cancer Invasion and Resistance research group. As part of this work, Aikaterini helped establish a completely new technique that researchers use to study cancer cells taken from patients with high-grade serous adenocarcinomas. The cancer cells are cultured in the laboratory in a gel so that they form small three-dimensional tumours – mini-tumours. The major advantage of this technique is that it provides a much better picture of how cancer grows in the body than other tissue culture techniques used in the laboratory. Once the tumours were established, Aikaterini tested treatments targeting weaknesses in the cancer cells in the mini-tumours. The laboratory work also includes genetic analyses carried out by collaborators, including researchers at the universities of Turku and Helsinki in Finland. Ovarian cancer cells can exhibit different characteristics from patient to patient, and Aikaterini analyses the mini-tumours to identify vulnerabilities that may help point to new treatments targeting cancer cells more precisely.

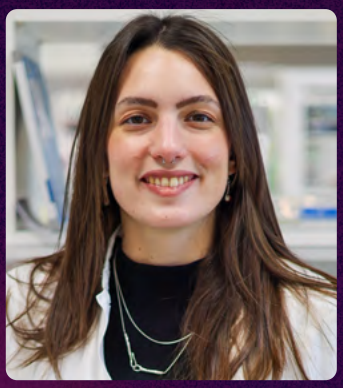
– We hope that, over time, this work may lead to clinical trials and new treatments for patients, she says.

As part of Aikaterini's PhD project, the mini-tumours have been deposited in a biobank so that other researchers can also access them. Culturing the mini-tumours is both time-consuming and technically challenging. It is therefore a great advantage for other researchers to be able to use the already established mini-tumours together with the associated genetic and molecular data, enabling new research to get started more quickly for the benefit of patients.

Aikaterini's PhD is part of the international DECIDER project, which aims to generate knowledge to help clinicians choose the best treatment for ovarian cancer. Her work over the past four years aligns well with the goals she had when she began studying chemistry in Greece. At the time, she wanted to make a difference for patients by developing new medicines.

– I wasn't sure whether a PhD was right for me, but when I heard about DECIDER, I had no doubts. It is a visionary project that could have a major impact on treatment, and I believe our results are already well on the way to contributing to that, she says.

Aikaterini is employed in the Cancer Invasion and Resistance research group until June 2026. During this final period, she will complete ongoing work and begin a new project investigating whether other types of existing medicines may help women with ovarian cancer.



Meet Aikaterini Skorda

31-year-old Aikaterini Skorda was born in Greece, where she completed a bachelor's degree in chemistry.
In 2018, she moved to Denmark to study for a master's degree in medicinal chemistry at the University of Copenhagen. Her project supervisor since 2019 has been Tuula Kallunki, group leader at the Danish Cancer Institute, and in early 2021 Aikaterini began her PhD as a member of Tuula Kallunki's Cancer Invasion and Resistance research group.
After defending her PhD in February 2025, she was employed as a postdoctoral researcher in the research group.

Training the next generation of cancer researchers

A total of 8 PhD students graduated from DCI in 2025.

See the list of PhD graduates in 2025

RESULT FROM 2025

Cell division explains how cancer medicines work

Jiri Bartek

In 2025, the Genome Integrity research group contributed new knowledge about how cancer medicines known as CDK4/6 inhibitors work. The results have been published in one of the world's leading scientific journals.

When a new drug is introduced for the treatment of cancer, it must be thoroughly tested. It is typically the pharmaceutical company that must demonstrate that the drug is safe and effective in treating cancer. They must also disclose what side effects may be associated with the treatment. However, even though medicines are carefully studied before reaching patients, new insights into how they work in the body may emerge later, sometimes through research by other scientists. This is the case in a new research project that has examined the processes that take place when cells divide. The new study provides entirely new insights into cell division and at the same time offers a new understanding of the mechanism of action behind a particular group of cancer medicines known as CDK4/6 inhibitors. CDK4/6 inhibitors are a new type of medicine approved for the treatment of breast cancer, among other indications. This opens up several promising prospects for patients.

– The results explain how existing cancer treatments work, but they are at least as important for understanding how our bodies function, how cancer arises and, in the longer term, for the development of new and effective cancer treatments, says Professor Jiri Bartek, head of the Genome Integrity research group, who contributed to the new research.

More closely connected than previously thought

DNA is found in our cells, and before a cell can divide into two, its entire genetic material must first be copied. DNA replication and cell division are tightly regulated, as errors can lead to serious diseases such as cancer. The new research shows that these two processes are far more closely connected than previously believed, and that two particular types of proteins play key roles in both processes. The proteins in question are Cyclin-Dependent Kinases 4 and 6 (abbreviated CDK4/6) and the protein retinoblastoma (abbreviated pRB). Until now, it has been widely believed that CDK4/6 and pRB "communicated" with each other to control cell division by altering cells' gene activity profiles from the early to the later phases of the cell cycle. In this process, CDK4/6 regulated pRB, effectively acting as a green light that allowed the cell division cycle to proceed. However, the new research shows that CDK4/6 and pRB also influence each other earlier, already before the actual DNA replication, through the regulation of the many specific sites in our genome where DNA replication begins. Only once the DNA has been prepared and subsequently copied is a signal passed on in the system, allowing cell division to continue. The new findings therefore explain that cancer drugs inhibiting CDK4/6 work because they prevent the regulation of the retinoblastoma protein and thereby stop the DNA from being prepared for division. At the same time, the new research also holds prospects for future cancer treatments. Today, most efforts to improve treatment with CDK4/6 inhibitors focus on their effect on cell division. However, cancer cells can over time develop resistance to this treatment.

– We carried out experiments in which we inhibited both CDK4/6 and the process that prepares DNA for division at the same time. This caused the cells to divide before the DNA was ready, resulting in cells that were so damaged that they died. In this way, our research may help develop treatments that work in entirely new ways, explains Jiri Bartek.

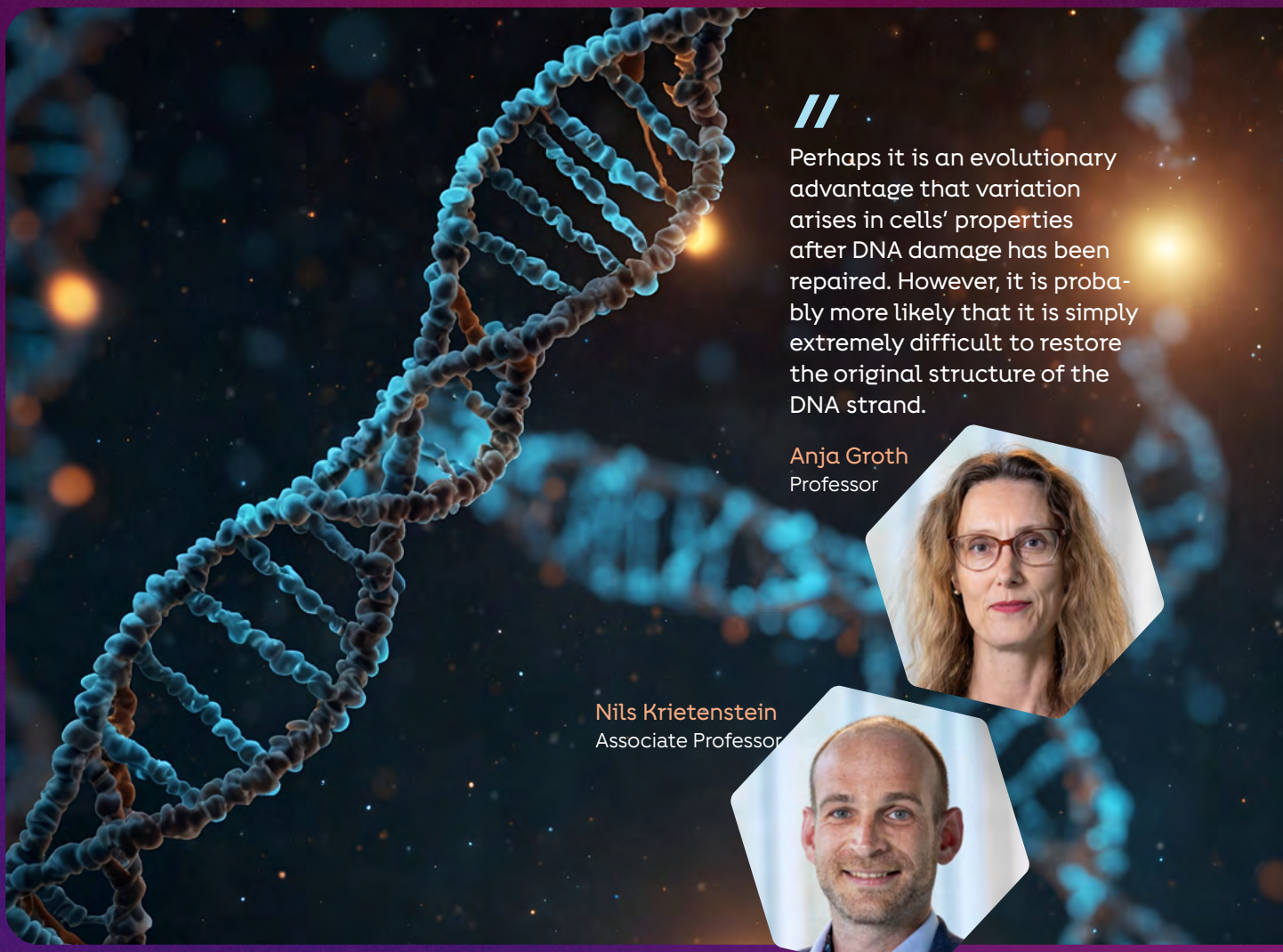
The results are published here: *Piscitello AS. et al.: Temporal control of human DNA replication licensing by CDK4/6-RB signalling and chemical genetics. Nat Commun. 2025, Sep 12. DOI: 10.1038/s41467-025-63669-8.*

RESULT FROM 2025

Surprising insight:

What happens when cells repair DNA damage

DNA damage can permanently change a cell's function. This is shown by new research that challenges the assumption that cells remain unchanged once damage has been repaired.

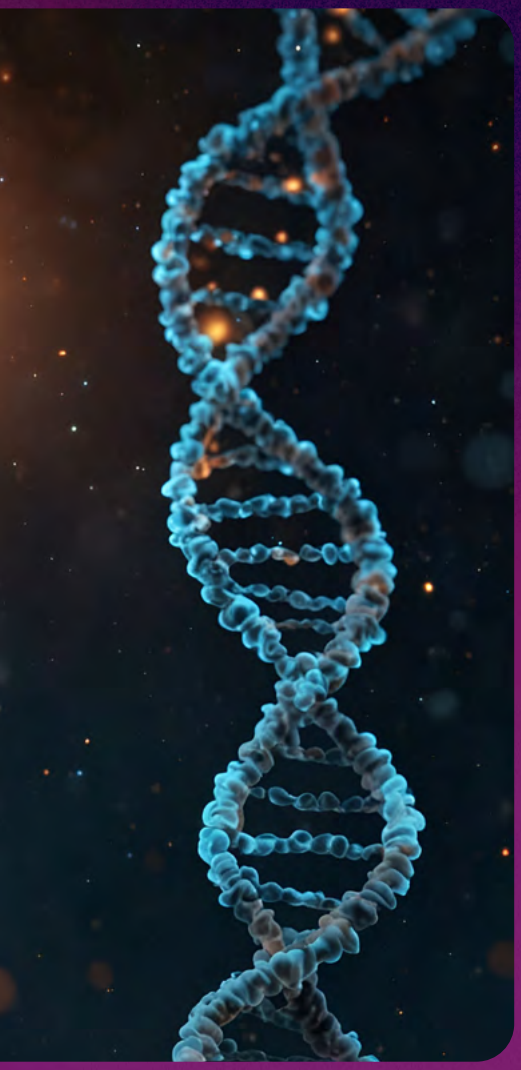


"Perhaps it is an evolutionary advantage that variation arises in cells' properties after DNA damage has been repaired. However, it is probably more likely that it is simply extremely difficult to restore the original structure of the DNA strand.

Anja Groth
Professor

Nils Krietenstein
Associate Professor

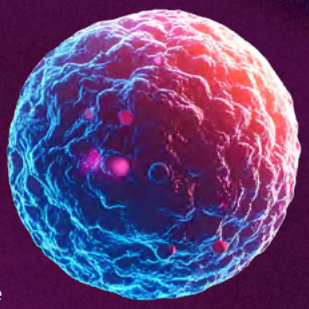
If errors occur in the DNA – for example breaks in the DNA strand – this can lead to mutations that alter the function of the cell. Over a lifetime, many DNA lesions occur, and in the worst case this can lead to cancer. To counter this, the body has efficient systems in place that rapidly repair such damage. Until now, researchers believed that DNA was essentially as good as new once it had been repaired. Like patching a puncture on a bicycle tyre and simply riding on. But it is not that simple. A new study published in the leading journal Science shows that, following a DNA strand break, the organisation of DNA in the cell nucleus can be permanently altered – even after successful repair. This particularly affects the way DNA is folded in three dimensions. The altered structure persists and is passed on to new cells when they divide.



– The folding of DNA is crucial for determining which genes are read. This affects how the cell functions and can give the cell new properties, explains Associate Professor Nils Krietenstein from the Genome Organization and Gene Regulation research group.

He is an expert in the three-dimensional folding of DNA and took part in the new study together with, among others, Professor Anja Groth from the Epigenome Replication and Maintenance research group, and Susanne Bantele and Professor Jiri Lukas from the Novo Nordisk Foundation Center for Protein Research at the University of Copenhagen, who led the study. The new findings may also help us better understand cancer. Tumours consist of many cancer cells, which typically have varying properties. This means that cancer treatments targeting one specific change do not necessarily work on all cancer cells. Some survive, and these may later lead to the cancer returning in a more aggressive form.

– Our discovery may help us understand how cancer cells evolve and survive treatment, says Nils Krietenstein.



The new research therefore suggests that there are aspects of cell biology that we still do not fully understand. One of the questions raised by the new findings is how these changes persist and are passed down to daughter cells. According to Anja Groth, the researchers do not yet have an answer to that question.

– Perhaps it is an evolutionary advantage that variation arises in cells' properties after DNA damage has been repaired. However, it is probably more likely that it is simply extremely difficult to restore the original structure of the DNA strand, she says.

The discovery is also relevant for gene technologies such as CRISPR, where targeted changes are made to DNA. In this context, it will be important to monitor whether the editing unexpectedly alters the three-dimensional structure of DNA and thereby affects the expression of neighbouring genes.

The results are published here:
Bantele S. et al.: Repair of DNA double-strand breaks leaves heritable impairment to genome function. Science. 2025, Nov 6. DOI: 10.1126/science.adk6662. Epub 2025 Nov 6.

DNA and cell nuclei

The DNA in a single cell is about two metres long, yet it is packed into a cell nucleus only about 7 micrometres in diameter. By comparison, a human hair is about 100 micrometres thick. DNA is packaged inside the cell nucleus in a way that allows the genetic information to be expressed. Special proteins called histones, together with other proteins, ensure that the DNA is packaged correctly.

RESULT FROM 2025

Combination therapy increases cancer cells' sensitivity to immunotherapy

Daniela De Zio

In recent years, immunotherapy has shown promising results in the treatment of several types of cancer. But for many patients, it does not work. A new method offers hope that more patients may benefit from this approach.

In the future, immunotherapy may become a treatment for even more types of cancer than today. In laboratory experiments, researchers have identified a method that makes immunotherapy effective against melanoma tumours that were previously unresponsive to the treatment. This was achieved by combining the chemotherapy drug thiopurine with immunotherapy:

– We found that immunotherapy worked much better when used in combination treatment, especially when we treated the tumours while they were still small. In those cases, all tumours shrank, and most of them actually disappeared completely, says Daniela De Zio, team leader of the Melanoma Research Team in the Cancer and Medicine research group.

But the promising results did not stop there:

– In addition, we discovered that if new cancer cells are introduced after the cancer has disappeared, they do not grow. This suggests that the treatment enables the immune system to remember the cancer cells, which could be highly significant in preventing the cancer from returning, says Daniela De Zio.

From 'cold' to 'hot' tumours

The explanation for the promising results lies in how immunotherapy works. The treatment helps the immune system to detect and attack cancer cells because it recognises them as foreign to the body. However, some cancer cells resemble healthy cells so closely that the immune system does not detect them. These tumours are known as 'cold tumours'. This is where treatment with thiopurine plays a key role. It causes a number of genetic changes in the cancer cells, altering their appearance. This enables the immune system to recognise them as foreign and target them for attack. When this happens, the tumours are said to change from 'cold' to 'hot'.

The new study examined a particular form of melanoma that is not visible to the immune system, but 'cold' tumours are found across all types of cancer. This raises hope that the method may benefit patients with several different types of cancer. Thiopurine is also a well-known chemotherapy drug used to treat children and adults with blood cancers and other conditions. The drug typically has few side effects and is well tolerated by patients. The researchers therefore consider it safe to use in combination therapy.

The results were achieved in collaboration with Professor Kjeld Schmiegelow from the paediatric oncology department at Rigshospitalet, and the researchers are now continuing their work to test the treatment in other types of cancer.

– The next step will be to test the treatment on other types of cancer cells. This will provide important knowledge that may hopefully pave the way for offering the treatment to patients in clinical trials, says Daniela De Zio.

The immunotherapy used in the study

In the study, the researchers combined the chemotherapy drug thiopurine with immunotherapy of the types anti-PD-1 and anti-CTLA-4.

The Danish Cancer Society supports research

The project 'Thiopurine-based therapy as a new strategy to increase tumor immunogenicity and enhance response to ICI-therapy' received DKK 1,550,000 from the Danish Cancer Society Scientific Committee – Biology & Clinic/ People & Society in 2022.

The results are published here: *Nazerai L. et al.: Thiopurine therapy enhances immune checkpoint inhibitor efficacy in low-mutational burden melanoma: A promising anticancer approach. Proc Natl Acad Sci USA. 2025, Mar 4. DOI: 10.1073/pnas.2423246122. Epub 2025 Feb 24.*

RESULT FROM 2025

Cancer patients should be cautious when using dietary supplements

Around half of all Danes use dietary supplements, and women with breast cancer often increase their use following diagnosis. However, research from 2025 suggests that breast cancer patients should be cautious.

Overall, dietary supplements are not associated with longer survival after breast cancer. This was shown in a study from the Diet, Cancer and Health research group in 2025. The results are therefore in line with the health authorities' recommendations on the use of dietary supplements.

The study includes 1,951 women from the Diet, Cancer and Health cohort study who reported their use of dietary supplements before and after their diagnosis. The researchers found a slight tendency for women who took multivitamins to live somewhat longer, but no such association was found for other types of supplements, whether taken alone or in combination with multivitamins.

An important part of the study concerns the use of dietary supplements during cancer treatment. Women who received chemotherapy while also taking antioxidants had a shorter expected survival. This suggests that certain supplements may negatively affect the effectiveness of treatment. According to senior researcher Cecilie Kyrø from the Diet, Cancer and Health research group, who led the study, this is consistent with previous studies. These show that antioxidants may counteract the effect of treatments that work through oxidative stress, such as chemotherapy and radiotherapy.

– For this reason, I would be cautious about taking antioxidant supplements during chemotherapy, says senior researcher Cecilie Kyrø.

The study also mapped the total intake of vitamins and minerals that participants received through both diet and supplements. This showed that most people in Denmark already meet their needs through their diet. For some individuals, dietary supplements may lead to excessive intake, particularly of vitamin A and iron, which in the study was associated with a tendency towards shorter survival after breast cancer. Cecilie Kyrø therefore emphasises that people should adhere to the recommended doses if they choose to take supplements. However, a standard multivitamin–mineral supplement is considered safe.

There are currently no Danish guidelines specifically for cancer patients' use of dietary supplements, but the World Cancer Research Fund recommends that people with or after cancer obtain vitamins and minerals through their diet rather than from supplements. The new research supports this recommendation: No overall benefit was observed – and in some cases there were indications of possible harm. Cancer patients should therefore exercise caution and consult their doctor before taking dietary supplements.

The Danish Cancer Society supports research

The project 'Phytoestrogens and breast cancer – effects of phytoestrogens on markers of disease progression and gene expression' received DKK 2,065,000 from Knæk Cancer in 2017.

Cancer and vitamin D

The Danish Health Authority's recommendation of 5–10 micrograms of vitamin D daily during the winter months is not changed by the new research. High intakes were in fact associated with shorter survival after breast cancer, so the recommended doses should not be exceeded in this case either.

The results are published here: *Kyrø C. et al.: Dietary supplement use and life expectancy after breast cancer – The Danish Diet, Cancer and Health cohort. J Nutr. 2025, Sep 29. DOI: 10.1016/j.tjnut.2025.09.035. Online ahead of print.*

RESULT FROM 2025

Cellular self-digestion linked to liver disease

Lisa Frankel

Research into how cells respond to food deprivation sheds light on the mechanisms behind liver disease. The findings may have important implications for understanding and treating non-alcoholic fatty liver disease, a condition that can lead to serious complications such as liver cancer.

What happens inside our cells when the body lacks food? New research brings us closer to an answer. It describes how cells break down parts of themselves in order to obtain energy and survive periods of nutrient deprivation. This happens through a process called autophagy, and the new research is groundbreaking on several levels, explains group leader and PhD Lisa Frankel from the Cellular Homeostasis and Recycling research group, who led the new study.

– We provide new knowledge about how a fundamental function in our cells works. This is important both because it increases our understanding of how the body functions and because, in the long term, it may be used in the treatment of disease, she says.

Autophagy literally means self-digestion. In this process, cells break down parts of themselves in order to release nutrients that can be used as energy or as building blocks for new cell components, for example during cell division. Errors in the regulation of autophagy can, among other things, lead to cancer and may contribute to the disease becoming resistant to treatment. Autophagy is activated especially when cells lack nutrients. In this process, the material to be broken down is encapsulated in small transport vesicles – like tiny suitcases carrying molecules to the cell's degradation sites. The new research shows that a particular molecule plays a special role in this process.

– The molecule Pellino 3 is central to regulating this starvation-induced autophagy. More specifically, Pellino 3 is responsible for initiating the chain reaction that ultimately leads to the breakdown of cellular debris, says postdoc Srinivasa Kolapalli from the Cellular Homeostasis and Recycling research group, who led the laboratory experiments.

Autophagy is therefore particularly important for supplying the cell with energy and building blocks. It is well known that autophagy plays an especially important role in tissues with high energy demands, such as the brain, muscles and liver. During periods of nutrient deprivation, the liver plays a key role in storing energy as fat droplets. In this process, autophagy ensures that the fat is gradually broken down so that it does not accumulate unnecessarily. The new research shows that Pellino 3 is also important for this natural breakdown. Cells lacking Pellino 3 were no longer able to break down their fat reserves, and the degradation process came to a halt. In mice lacking Pellino 3 that were subjected to fasting, this meant that the animals developed fatty liver because they were unable

About autophagy

Autophagy has been vital throughout evolution, during which there have been periods of both abundant food and scarcity. To survive periods of nutrient deprivation, cells have relied on autophagy. Autophagy involves encapsulating the material to be broken down within a membrane that forms a rounded structure called an autophagosome. The autophagosome then undergoes a series of changes before ultimately fusing with small acid-filled vesicles within the cell, known as lysosomes. Enzymes from the lysosomes subsequently break down the encapsulated cell components. In this way, the cell is able to degrade worn-out components that it no longer needs. Following degradation, the cell can reuse the molecular building blocks.

to break down the fat droplets through autophagy.

– The role of Pellino 3 in preventing fatty liver is supported by the fact that patients with this disease often have lower levels of Pellino 3 in their liver. This suggests that Pellino 3's regulation of autophagy helps protect the liver and keep it healthy. This is important new knowledge about the mechanisms behind the disease and may, in time, pave the way for improved treatment of liver disease, says Srinivasa Kolapalli.

The results are published here: *Kolapalli S. et al.: Pellino 3 E3 ligase promotes starvation-induced autophagy to prevent hepatic steatosis. Sci Adv. 2025, Jan 17. DOI: 10.1126/sciadv.adr2450. Epub 2025 Jan 17.*

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The Danish Cancer Society supports research

The project 'New insight and targeting opportunities in renal cell carcinoma: revealing the actions of an oncogenic E3 ligase' received DKK 3,000,000 from the Danish Cancer Society Scientific Committee – Biology & Clinic in 2023.
The project 'Characterization of oncogenic RNA-binding proteins in the autophagy-cancer interplay' received DKK 2,325,000 from the Danish Cancer Society Scientific Committee in 2020.
The project 'Selective ribosome degradation by autophagy in cancer development' received DKK 2,680,000 from Knæk Cancer in 2018.

NEW PROJECT FROM 2025

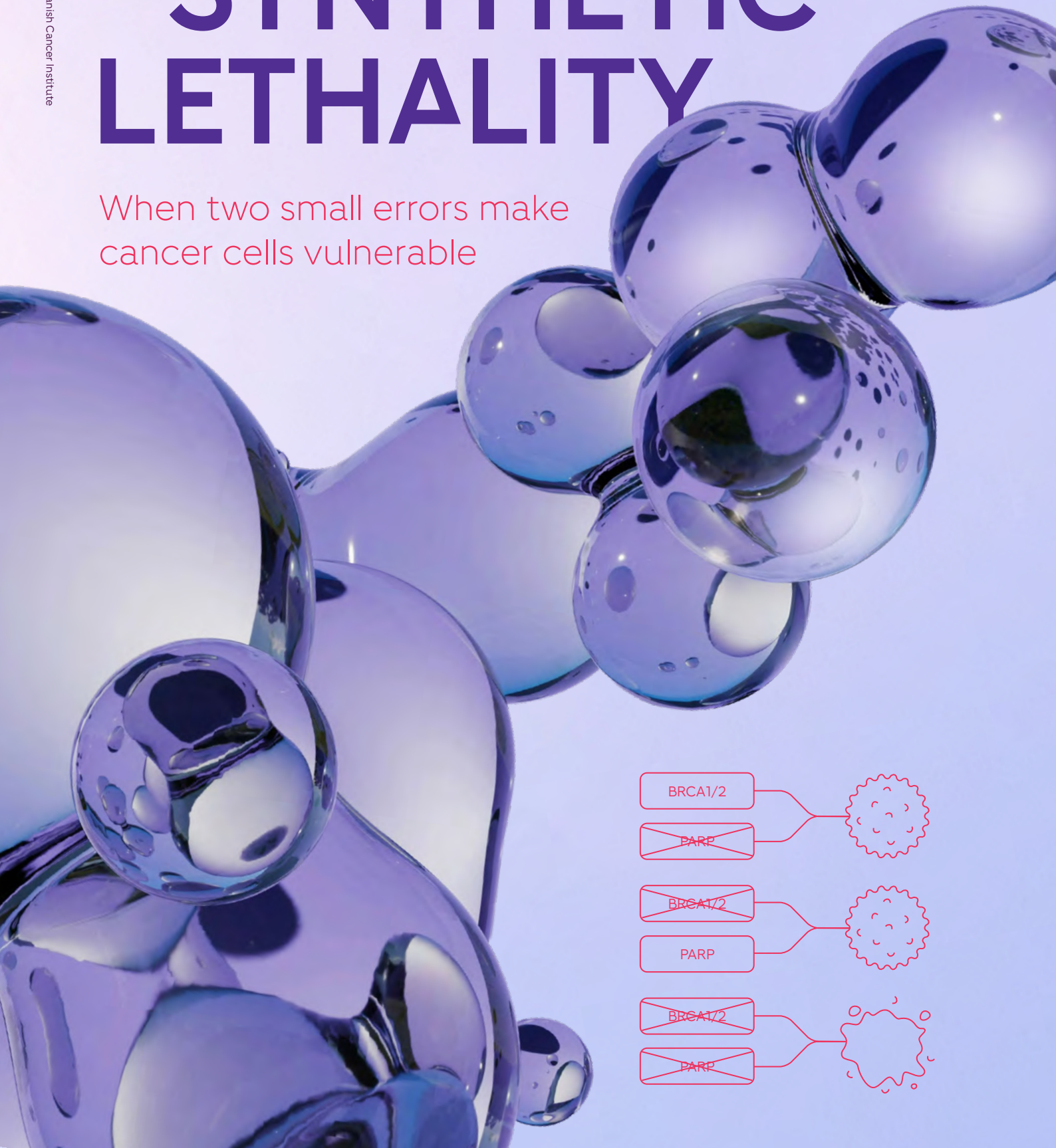
Hormonal contraception and health

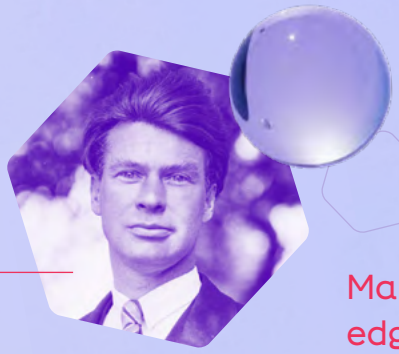
Millions of women around the world use contraception for much of their lives. Yet we know surprisingly little about what it means for the body to be exposed to hormones for up to 15 years. This gap in knowledge forms the starting point for WISE-Use, a new research project led by senior researcher and team leader Lina Mørch from the Treatment and Cancer research team. The project aims to answer questions that both women and healthcare professionals are left with, including how new types of contraception affect health – from cancer and cardiovascular disease to mental responses such as mood changes. At the same time, the researchers are examining whether low-dose hormonal IUDs can be used to relieve severe menstrual pain or treat conditions such as endometriosis. Children's health is also in focus: What are the implications if a mother uses hormonal contraception? WISE-Use is based on unique data sources, including large health registries from Denmark and Sweden as well as detailed information from more than 200,000 Danish women. Using the most advanced statistical methods, the researchers can use these data to emulate the effects of large clinical trials without having to wait decades for results. Through WISE-Use, the researchers aim to generate new insights into both the risks and potential benefits of current hormonal contraceptives and to provide a more realistic picture of their impact on women's long-term health.
They hope to generate knowledge that can support individualised counselling, taking into account each woman's age, prior contraceptive use and family history. The study is conducted in collaboration with Hillerød Hospital, Steno Diabetes Center Copenhagen and Karolinska Institutet.

Lina Mørch

SYNTHETIC LETHALITY

When two small errors make cancer cells vulnerable





Many new cancer treatments are based on knowledge about the genetic alterations present in a patient's cancer cells. This approach is known as personalised medicine, and one of the fundamental principles behind the development of such treatments is synthetic lethality. It is an effective way of developing drugs that specifically target cancer cells.

Calvin Bridges was among the first to use fruit flies in research. As anyone who has left fruit on the kitchen counter knows, these small creatures are hardy and reproduce quickly. For Calvin Bridges, this helped make fruit flies particularly well suited as experimental organisms in genetics: The flies were easy and inexpensive to keep, their short life cycle made it possible to follow heredity across several generations in just a few weeks, and the large number of offspring provided substantial data for each experiment. Together with colleagues, Calvin Bridges worked in a genetics laboratory at Columbia University in the United States that became known as "The Fly Room". There, he contributed to a series of discoveries that laid the foundations of modern genetics.

In 1922, he showed that if two genetic changes occur in fruit flies at the same time, they die. This was the first description of the phenomenon of synthetic lethality, which describes how two genetic changes that are harmless on their own become lethal when occurring together.

Today, the concept of synthetic lethality covers more than just two genetic changes. It can also describe interactions in which a genetic change makes the cell dependent on a specific protein for survival. Researchers use this knowledge in cancer research to identify medicines that can kill cancer cells with a specific genetic alteration. Rather than targeting the defective gene directly, the strategy is to target the protein or molecule that has become important because of the genetic change. This approach will not affect healthy cells without the genetic change in the same way.

A well-known example of synthetic lethality is seen in alterations in the genes BRCA1 and BRCA2, which can increase the risk of, among other things, breast cancer. The genetic alteration makes cancer cells particularly dependent on the protein PARP. For this reason, medicines have been developed that inhibit PARP, and these are now used to treat cancer patients with alterations in the BRCA1 or BRCA2 genes. This form of treatment has proved so effective that it works against several types of cancer, and researchers are now systematically searching for new combinations of synthetic lethality. One way of doing this is by using the CRISPR method, which can edit genes. In a single experiment, the CRISPR technique allows researchers to examine all 20,000 genes in the human body. This can help identify new combinations of synthetic lethality. One approach is to analyse cancer cells that carry a known genetic alteration. CRISPR is then used in these cells to remove other genes one by one, revealing which are more important for the cell's survival than they are in normal cells.

Another approach to synthetic lethality involves examining existing chemotherapy drugs. By treating cancer cells with chemotherapy and then using CRISPR to remove selected genes, researchers can determine which genetic alterations are necessary for the chemotherapy to work.

Finally, CRISPR can be used to study specific genetic alterations – for example in the BRCA1 or BRCA2 genes – and examine how particular regions of a gene influence the risk of developing disease.

From fruit flies in the 1920s to advanced gene analyses today, synthetic lethality has evolved from a genetic curiosity into one of the most promising principles in modern cancer treatment.

Alterations in the BRCA1 or BRCA2 genes make cancer cells particularly dependent on the protein PARP, and for this reason, cancer drugs that inhibit PARP have been developed. This is a classic example of synthetic lethality.

CRISPR
reveals vulnerability to TOP2 chemotherapy

TOP2 inhibitor chemotherapy is used against colorectal cancer and other cancers, but does not work equally well in all patients and often has serious side effects. Based on the principle of synthetic lethality, Professor Niels Mailand from the Danish Cancer Institute has investigated which genetic alterations in cancer cells are required for the drugs to kill them. Using the gene-editing technique CRISPR to modify genes in cancer cells treated with a TOP2 inhibitor, the research shows that the treatment works best in cancer cells with low levels of the protein histone H1. This means that, in the future, it may be possible to measure histone H1 levels in patients. This could allow for lower doses of TOP2 inhibitors in patients with low histone H1 levels, as their cancer cells are particularly vulnerable to the treatment. Lower doses would also spare healthy cells and thereby reduce side effects.

The results are published here: *Ingham A. et al.: CRAMP1-dependent histone H1 biogenesis is essential for Topoisomerase II inhibitor tolerance. Mol Cell. 2025, May 27. DOI: 10.1016/j.molcel.2025.04.006. Epub 2025 Jun 13.*

GENE LEXICON
guides treatment for BRCA2 alterations

Researchers have developed a genetic lexicon that can guide doctors in providing the best treatment for patients with alterations in the BRCA2 gene. Using the gene-editing technology CRISPR, researchers at the Danish Cancer Institute analysed 6,500 specific alterations in the BRCA2 gene. The results show which alterations lead to cancer and which are harmless. They also reveal whether there is synthetic lethality between each alteration and a range of chemotherapy treatments – in other words, which type of chemotherapy is most effective for treating the cancer that the genetic alteration may cause. The gene lexicon is available online and can be used by doctors around the world to advise people with BRCA2 alterations and help choose the most effective treatment.

The results are published here: *Sahu S. et al.: Saturation genome editing-based clinical classification of BRCA2 variants. Nature. 2025, Jan 8. DOI: 10.1038/s41586-024-08349-1.*

RESULT FROM 2025

Large-scale data and clinical trials improve treatment

Carsten Utoft Niemann

In 2025, the Hematology research group contributed knowledge that changed the clinical guidelines for people with blood cancer. The changes provide patients with more personalised treatment with fewer side effects and have implications both in Denmark and internationally.

When doctors decide which treatment is best for a patient, they typically consult the clinical guidelines for the patient's disease. These guidelines use the latest research evidence to recommend which treatment should be given. This ensures that cancer patients receive consistent, high-quality treatment. The guidelines are updated as new knowledge emerges. In 2025, the Hematology research group contributed new insights that will lead to an upcoming update of both the Danish and European guidelines on the treatment of blood cancer – for the benefit of patients.

The new knowledge comes from two clinical trials involving more than 1,800 patients with chronic lymphocytic leukaemia (CLL). One study examined treatment with targeted drugs of the venetoclax type and is based on the largest group of patients to date who have received venetoclax again after relapse. The results showed that patients with CLL can receive another course of venetoclax even if they previously received the drug as first-line treatment. The study also shows that most patients do very well after this second treatment, with more than 80% still not requiring further treatment after two years. This new knowledge about the treatment of patients with relapse has led to changes in the clinical guidelines. As a result, patients with CLL will in the future be offered targeted combination therapy in which venetoclax is included as first-line treatment. Previously, the guidelines recommended a combination of chemotherapy and immunotherapy – or BTK inhibitors alone. In the second study, the researchers showed that time-limited treatment for CLL works just as well as the previous standard, in which medication is given continuously over a longer period. This means that many patients can complete a treatment course of around one year and then take a break without compromising the effectiveness of the treatment. Time-limited treatments may therefore become a new preferred option for patients who have not previously been treated for CLL.

More patients survive

The research is led by consultant and clinical associate professor Carsten Utoft Niemann, who in addition to the Hematology research group is affiliated with the University of Copenhagen and Rigshospitalet. He is both pleased and proud to contribute to the advances in the treatment of blood cancer:

– Advances in the treatment of chronic lymphocytic leukaemia are happening rapidly. This leads to more effective treatments and means that more patients survive the disease. At the same time, it reduces the side effects that patients risk experiencing and provides knowledge that can improve the treatment of related diseases such as acute myeloid leukaemia, lymphomas and multiple myeloma, he says.

In addition to the clinical trials, Carsten Utoft Niemann and his colleagues also use large amounts of data in their work. By combin-

The Danish Cancer Society supports research

The project 'Personalized Treatment and Risk Assessment (PEARA) for Chronic Lymphocytic Leukemia' received DKK 2,325,000 from the Danish Cancer Society Scientific Committee – Biology & Clinic in 2020.

ing data from more than 70,000 Danish patients with blood cancer, the Hematology research group has established the database The Danish Lymphoid Cancer Research (DALY-CARE). This database brings together information about the patients' health, such as other diseases, side effects and treatment outcomes, as well as genetic analyses of the cancer. This enables researchers to examine many aspects of each individual patient, making it possible to understand why treatments work differently from patient to patient and to clarify which treatment is best for each person – both in terms of effectiveness against the blood cancer and the risk of side effects. Results from analyses based on DALY-CARE data can be combined with the clinical trials. This has supplemented the update of the clinical guidelines for CLL by describing the best treatments for patients based on factors such as comorbidities, the risk of complications and side effects and genetic analyses of the cancer. The results from the clinical trials were presented at the annual meeting of the American Society of Hematology in December 2025.

– Our research in blood cancer is a clear example of how the combination of clinical trials and large-scale data directly leads to new treatment standards and to better and less burdensome treatment pathways for patients around the world, says Carsten Utoft Niemann.

The results are published here:

Al-Sawaf O. et al.: Fixed-duration versus continuous targeted treatment for previously untreated chronic lymphocytic leukemia: . N Engl J Med. 2025, Dec 6. DOI: 10.1056/NEJMoa2515458.

Niemann C. et al.: Efficacy of 2nd-line treatment in CLL after venetoclax-based 1st-line treatment: Results from the GAIA/CLL13 trial. Abstract presented at the American Society for Hematology annual meeting, 2025.

Brieghel C. et al.: The Danish Lymphoid Cancer Research (DALY-CARE) data resource: the basis for developing data-driven hematology, Clin Epi. 2025, DOI https://doi.org/10.2147/CLEP.S479672.

IN BRIEF

Denmark's first centre for epigenetic cell memory

There was a celebratory atmosphere when the Center for Epigenetic Cell Memory (EpiC), a basic research centre, opened at the Danish Cancer Institute. Among the participants from the Danish Cancer Society was Managing Director Jesper Fisker, while the Danish National Research Foundation, which supported the establishment of the centre with DKK 67.4 million, was represented by its director Niels Mejlgaard. The new centre is headed by Professor and group leader Anja Groth from the Danish Cancer Institute, who is one of the world's leading experts in epigenetics. In her opening speech, she described how EpiC is a dream come true and explained that the aim of the centre is to investigate a fundamental biological question in order to better understand cancer and ageing. The work at EpiC takes place in close collaboration with Professor Niels Mailand, Professor Jakob Nilsson and Associate Professor Nils Krietenstein, who are all group leaders at the Danish Cancer Institute and part of the new basic research centre.

Many guests attended the opening of EpiC. Among them were (from left) Director of the Danish National Research Foundation **Niels Mejlgaard**, Professor and Director of EpiC **Anja Groth**, and Managing Director of the Danish Cancer Society **Jesper Fisker**. Photo: Danish Cancer Society

Hormonal contraception linked to a slightly increased risk of childhood leukaemia

Maternal use of hormonal contraception up to or during early pregnancy may be associated with a slightly increased risk of the child developing leukaemia. This was shown in 2025 by the Virus, Lifestyle and Genes research group at the Danish Cancer Institute in a large Scandinavian study based on more than 3.1 million children. The overall risk remains very low, but the findings provide new and important knowledge about the possible role of hormones in the development of childhood cancer. The study found a particularly increased risk of non-lymphoid leukaemia, especially in connection with the use of combined oral contraceptives. An increased risk was also observed with newer progestin-based methods, including hormonal intrauterine devices and implants.

The results are published here:
Hemmingsen CH. et al.: Maternal Use of Hormonal Contraception and Risk of Childhood Leukemia: A Scandinavian Population-based Cohort Study. Eur J Cancer. 2025, Jan 17. DOI: 10.1016/j.ejca.2024.115168. Epub 2024 Dec 7.

More older women will develop breast cancer in the future

In the future, more women over the age of 80 will develop breast cancer, particularly the type that is easiest to treat. This is shown by research from the Cancer and Medicine research group at the Danish Cancer Institute. One explanation may be that more people are living longer and remain healthier in old age, making it possible both to diagnose the disease and to tolerate treatment. According to the researchers, the increase means that the healthcare system needs to prepare for a larger number of older cancer patients, who often have different needs and greater frailty. This may require larger multidisciplinary teams and more doctors specialising in geriatric health and disease.

The results are published here:
Palshof FK. et al.: Trends in breast cancer among elderly women: Development in estrogen and HER2 subtypes in the last ten years. Breast. 2025, Feb. DOI: 10.1016/j.breast.2024.103860.

Diabetes drug and cancer:

Low long-term risk but improved survival from other diseases

Many patients with diabetes are now treated with GLP-1RA drugs, which help regulate blood sugar levels. One GLP-1RA variant is the well-known and widely used weight-loss drug Wegovy. However, little is currently known about the health effects of using these drugs over many years. Researchers from the Cancer and Medicine research group at the Danish Cancer Institute have now investigated this in diabetes patients who have used GLP-1RA drugs for up to 10 years. The treatment does not increase the overall risk of cancer during the first five years of use, but a small increase is observed after six to ten years. The researchers believe this may be because more patients – who already have an elevated cancer risk – survive other diseases and therefore live long enough to develop cancer. The study also found a substantial survival benefit among patients treated with GLP-1RA. The researchers emphasise that more knowledge is needed about the effects of these drugs on specific cancer types, but on the whole consider the findings reassuring.

The results are published here:
Gamborg M. et al.: Long-term cancer risk in users of GLP-1 agonists in Denmark: a nationwide emulated trial. Lancet Reg Health Eur. 2025, Jun 14. DOI: 10.1016/j.lanepe.2025.101346. eCollection 2025 Aug.

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The Danish Cancer Society supports research

The project 'Neoplasms in users of GLP-1 agonists: Assessments of safety and anti-neoplastic properties using nationwide disease and prescription registries' received DKK 1,900,000 from the Danish Cancer Society Scientific Committee – People & Society in 2023.

New uses for existing medicines

Researchers from the Danish Cancer Institute, led by Professor Zoltan Szallasi, are investigating whether existing drugs such as PARP inhibitors and alkylating agents can be used to treat more types of cancer than is currently the case. These medicines are currently used to treat ovarian cancer, but they may also prove effective against oesophageal and gastric cancers, as they work by targeting cancer cells with specific genetic alterations that occur across several cancer types. The researchers use methods from computational biology, analysing large volumes of genetic and molecular data to identify patterns that can predict which treatment is most effective for individual patients. With the development of artificial intelligence, Zoltan Szallasi and colleagues have also begun applying this technology in their work. In 2025, they received a grant from the Novo Nordisk Foundation in the form of allocated computing time on the Gefion supercomputer. Using these resources, the researchers will investigate whether artificial intelligence can predict which genetic alterations may lead to cancer and identify vulnerabilities in cancer cells that make them susceptible to treatment with PARP inhibitors. This strategy is known as synthetic lethality, which you can read more about on page 28.

THE SUPER COMPUTER

Gefion

Gefion is designed for training and developing artificial intelligence. The term supercomputer means that Gefion consists of thousands of processors that together can solve tasks that are too complex for ordinary computers. It will be used for projects in areas such as artificial intelligence, quantum research, medicine and the green transition. Researchers can purchase access to Gefion or apply for allocated computing time.

Source: *DCAI.dk and ai-portalen.dk*

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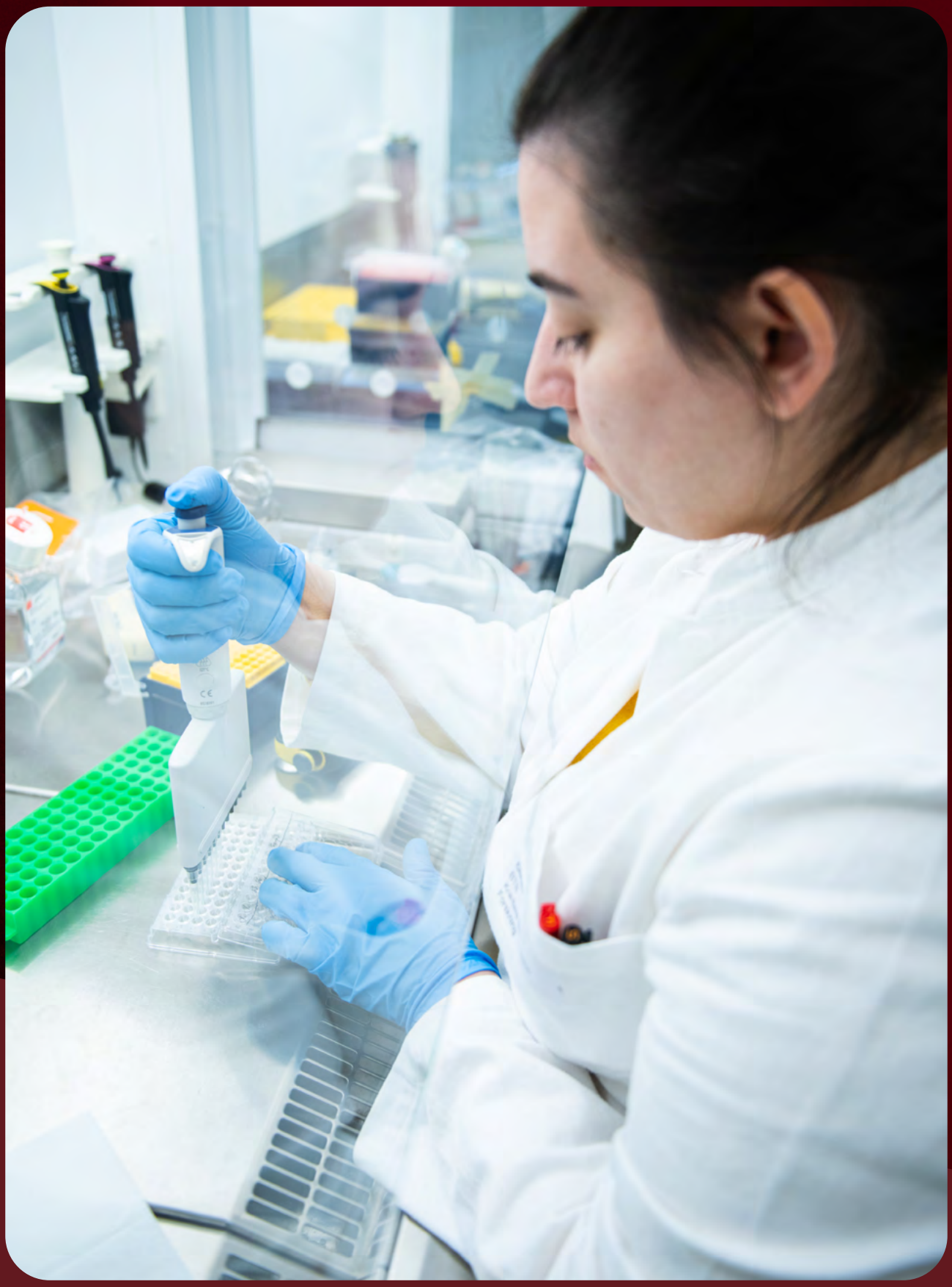
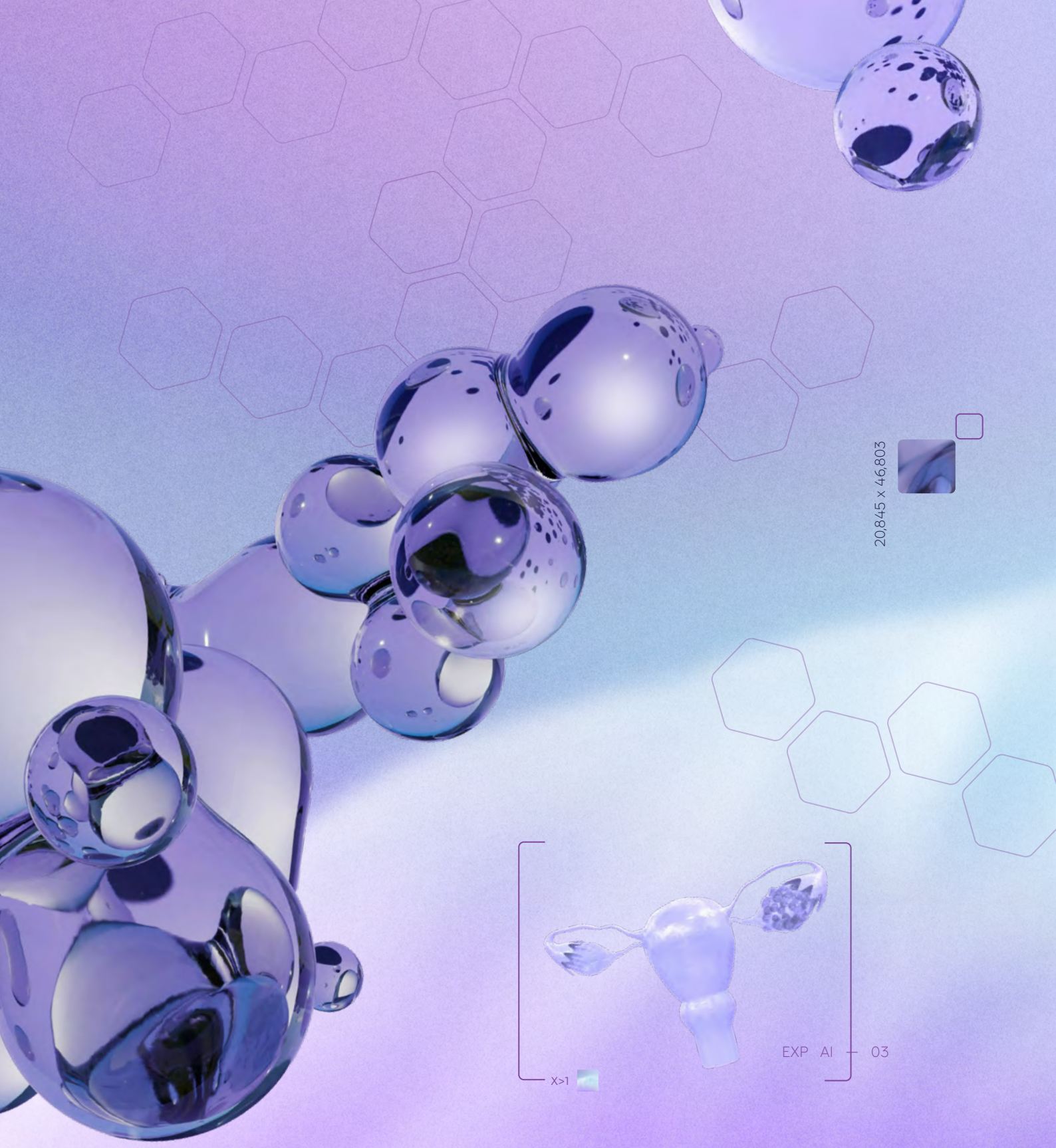
The Danish Cancer Society supports research

The project 'Improving survival in upper gastrointestinal cancer by targeting DNA repair deficiency specific therapeutic vulnerabilities' received DKK 2,625,000 from the Danish Cancer Society Scientific Committee – Biology & Clinic in 2022.



On behalf of the Danish Cancer Society, we thank everyone who has helped to make our research possible.

A life without cancer



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