“NOTHING IS IMPOSSIBLE.”

2023 YEAR IN REVIEW

LUNDIN CANCER FUND

“NOTHING IS IMPOSSIBLE.”

Every considerable challenge has a mountain to climb. Some challenges just have bigger mountains than most. In May 2023, Jack and William successfully summited Mount Everest, the apex achievement of Project No Limit, the campaign to raise awareness and funding for glioblastoma research and the Lundin Cancer Fund.

ISSUE 1

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“THERE IS NO LIMIT ON WHAT WE CAN ACHIEVE.”

LUKAS LUNDIN
1958 - 2022

BRAIN CANCER CAN BE BEATEN

Lukas Lundin believed there is no limit on what you can achieve.

Entrepreneurial and a visionary, Lukas was passionate about the resource industry and its power to transform lives through creating value at significant scale. Over his career, Lukas built a legacy of providing lasting and positive impacts for the benefit of many.

In 2020, Lukas developed a very aggressive form of brain cancer: glioblastoma. Lukas courageously battled glioblastoma and never gave up. Sadly, the cancer won the battle but it did not win the war. True to his spirit, Lukas was resolute in wanting to make a difference. It became evident there was little awareness, research and funding for glioblastoma and other brain cancers.

Lukas and the Lundin family wanted to change that by creating a new legacy: beating brain cancer.

The Lundin Cancer Fund was launched with a clear goal: improve treatments that increase the survival rate and quality of life for patients.

The Lundin Cancer Fund is a catalyst to advancing brain tumour research through strategic partnerships, pushing the boundaries of medical knowledge, and driving patient-centred treatment, ultimately aiming to improve survival rates and quality of life for individuals affected by brain tumours.

AN EXTRAORDINARY YEAR. AN EXTRAORDINARY LEGACY.

In a little over a year since the inception of the Lundin Cancer Fund, we have already made significant strides in advancing glioblastoma research.

Our most notable achievement has been the establishment and launch of the Lundin Family Brain Tumour Research Centre at the Lausanne University Hospital (CHUV) in Switzerland. The CHUV has been at the forefront in the fight against glioblastoma. We are grateful that Dr. Andreas Hottinger, Head of Neuro-Oncology at CHUV who treated Lukas, accepted the position to lead the centre's strategic research initiatives. The centre will be a significant platform to produce positive outcomes that can be shared globally.

In this inaugural Year in Review report, we are proud to show how we've come so far, so fast in delivering on our goal to create a meaningful legacy in improving treatment outcomes for those with brain cancer.

Through strategic partnerships and committed donors, we have the potential to create an extraordinary legacy by empowering the brain tumour research community, ultimately bettering the lives of those battling glioblastoma and other brain cancers around the world. We have already launched innovative projects, clinical trials and pivotal foundational work.

Our profound gratitude and thanks to all who share Lukas's and our conviction. Together, our collective effort will transform the landscape of glioblastoma research and care.

– The Lundin Family

WHAT IS GLIOBLASTOMA?

Glioblastoma is a fast-growing and very aggressive type of central nervous system tumour that forms from supportive tissue of the brain and spinal cord.

It is the most common and aggressive brain tumour in adults. It accounts for 70% of primary malignancy in the brain and 20% of all intracranial tumours. Glioblastoma usually occurs in adults and affects the brain more often than the spinal cord. Symptoms include headaches that keep getting worse, nausea and vomiting, blurred or double vision, and seizures.

Glioblastoma's ability to infiltrate surrounding brain tissue makes complete surgical removal nearly impossible. Patients require specialized care from a large number of specialists. Current treatment approaches involve a combination of surgery, radiation therapy, and chemotherapy, but even with aggressive treatment, prognosis remains poor. Long-term survival rates and mortality statistics for brain tumours – especially glioblastomas – have been virtually unchanged for decades only because of a lack of awareness and funding of clinical trials and research.

Better treatments are still urgently needed.

15-17 MONTHS

MEDIAN LIFE EXPECTANCY

for patients suffering from glioblastoma

5 YR

SURVIVAL RATE

Current treatments increased the survival rate from less than 2% in 2005 to 15% today

3 to 5

CASES

Per 100,000 people in Europe and North America develop glioblastoma each year

LUNDIN CANCER FUND: CREATED TO REALIZE MEANINGFUL OUTCOMES

Our Vision

Create a future where glioblastoma and other brain cancers are no longer a terminal diagnosis, personalized treatments are available, and patients experience improved survival rates and enhanced quality of life.

Our Mission

Advance the understanding, treatment and eventual cure of glioblastoma and other brain cancers.

Our Four Pillars

Strengthen research funding:

We will provide funds to complement limited research grants and, in addition, offer a research environment that boosts synergies between different research groups.

Create global collaboration:

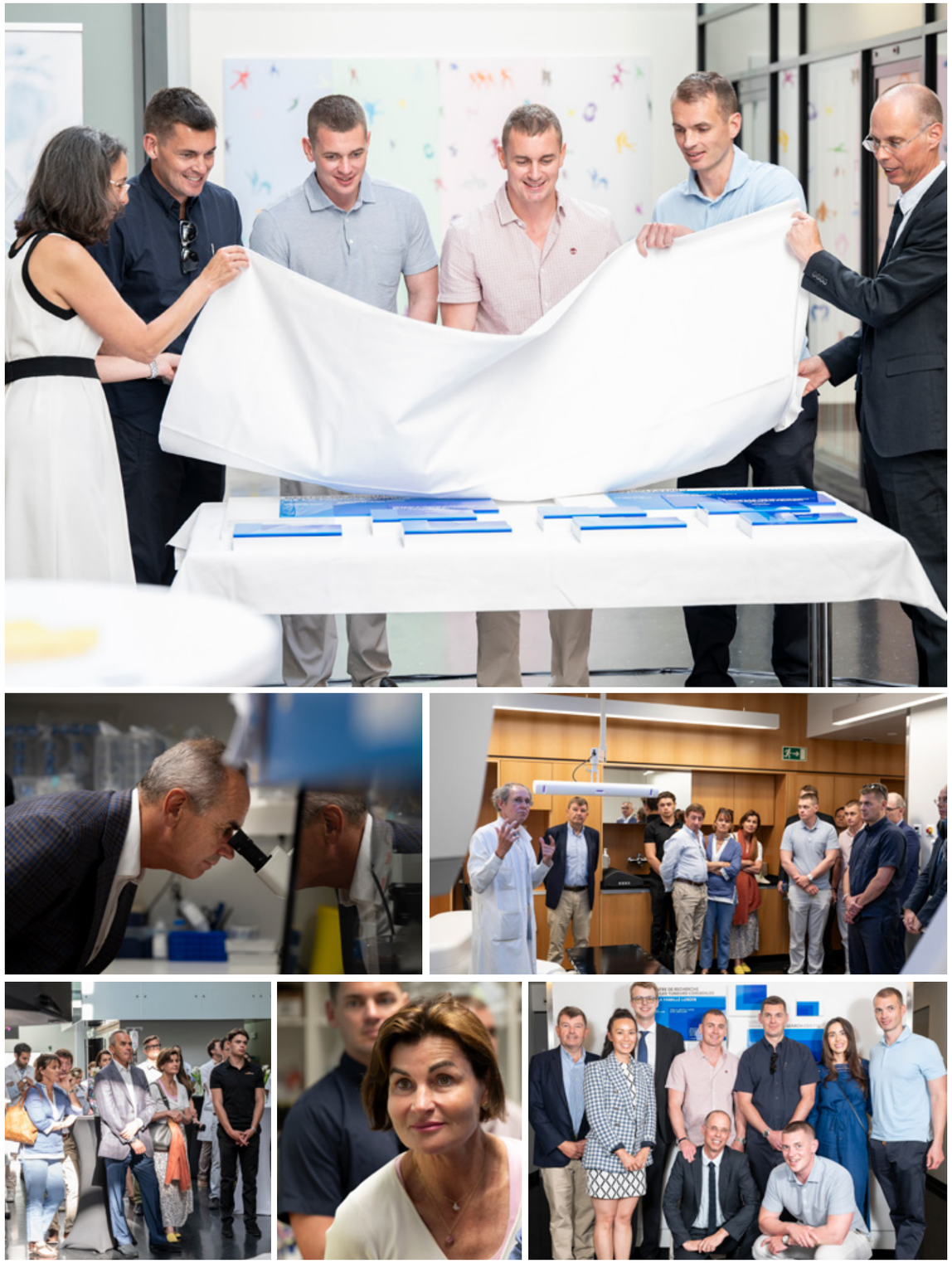
We will ensure universities and research institutes share information. Our focus is to integrate data from other institutions into a single, comprehensive, open-access database.

Grow clinical trial programs:

We will support clinical trials that have a high probability of radically changing patient outcomes. We also aim to expand the next generation of researchers through a post-graduate training program.

Improve knowledge translation & transfer:

We will bridge the gap between laboratory findings and clinical practice, ensuring scientific breakthroughs reach patients in a timely manner.



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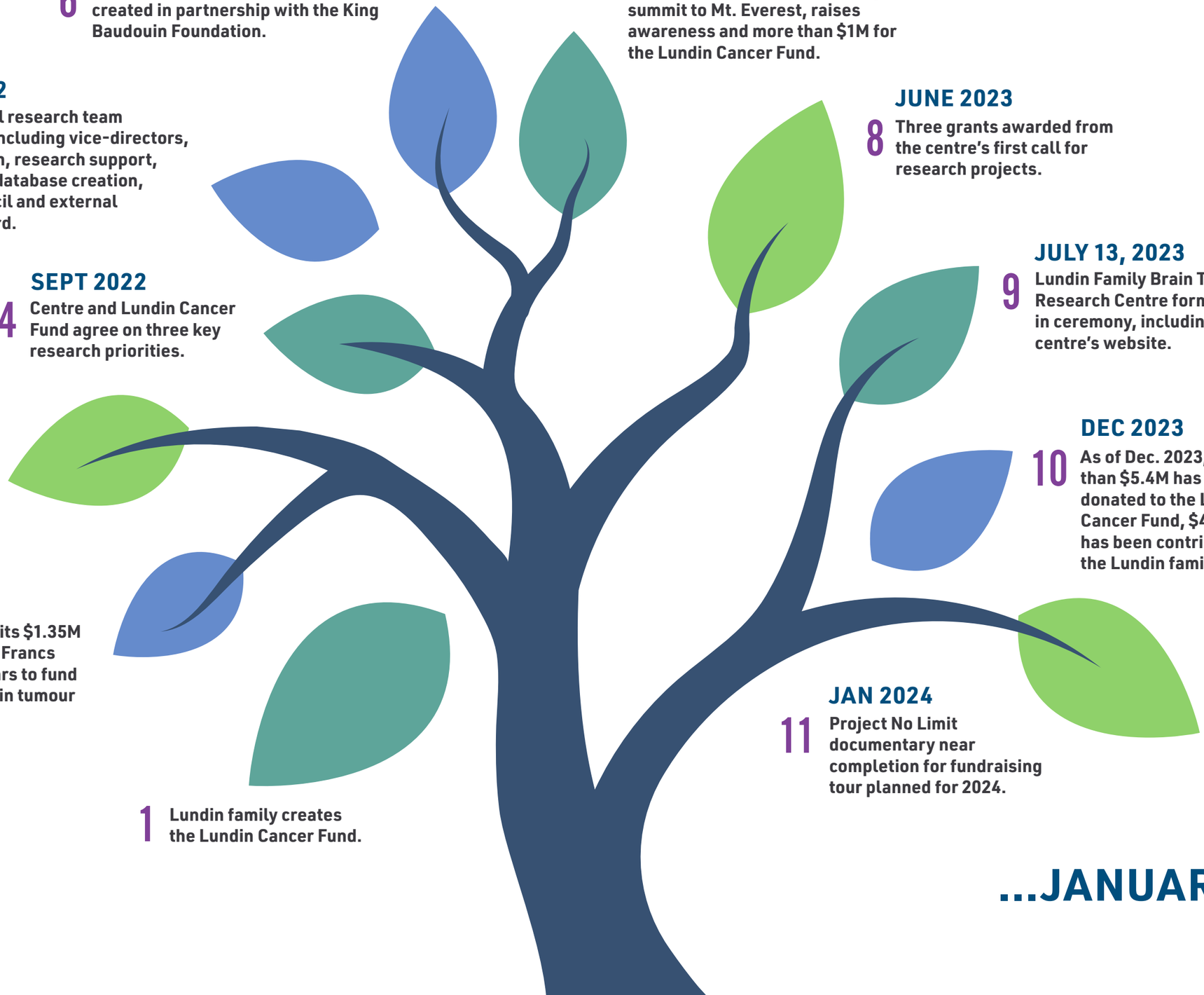
GROWING OUR IMPACT



APR 2023

6 International fundraising platform created in partnership with the King Baudouin Foundation.

MAY 2023

7 Project No Limit, Jack and William Lundin's successful fundraising summit to Mt. Everest, raises awareness and more than $1M for the Lundin Cancer Fund.

SEPT 2022

5 Centre clinical research team established, including vice-directors, administration, research support, open-access database creation, internal council and external scientific board.

JUNE 2023

8 Three grants awarded from the centre's first call for research projects.

SEPT 2022

4 Centre and Lundin Cancer Fund agree on three key research priorities.

JULY 13, 2023

9 Lundin Family Brain Tumour Research Centre formally unveiled in ceremony, including launch of centre's website.

JULY 2022

3 Dr. Andreas Hottinger, Head of Neuro-Oncology at CHUV, appointed director of centre.

DEC 2023

10 As of Dec. 2023, more than $5.4M has been donated to the Lundin Cancer Fund, $4M of which has been contributed by the Lundin family.

JULY 3, 2022

2 Lundin family commits $1.35M (CDN$2.12M) Swiss Francs annually over 10 years to fund the creation of a brain tumour research centre.

JAN 2024

11 Project No Limit documentary near completion for fundraising tour planned for 2024.

1 Lundin family creates the Lundin Cancer Fund.

JULY 2022...

...JANUARY 2024

LUNDIN FAMILY BRAIN TUMOUR RESEARCH CENTRE

The Lundin Cancer Fund has committed to a 10-year partnership with the Lausanne University Hospital (CHUV) to establish and lead the Lundin Family Brain Tumour Research Centre. This strategic partnership has been immediately instrumental in funding innovative research initiatives focused on understanding the complexities of brain tumours including glioblastoma. These efforts drive forward the knowledge base and allow researchers to explore new treatment avenues and improve patient outcomes.

Three focuses
The centre has three priority focuses that show promising high-impact:

1) Developing an open-access clinical database linked to the Brain Tumour Biobank of the CHUV
We will bridge existing tissue banks and open international data-sharing to accelerate discoveries.

2) Innovative combinations of targeted therapies and drug repurposing
In practical experiments, combined treatment showcased impressive outcomes.

3) Innovative preparatory research projects
Key findings may change our understanding of glioblastoma and management of patients.

1 DEVELOPMENT OF THE LUNDIN-CHUV OPEN-ACCESS DATABASE ON BRAIN TUMOURS

The primary benefit of an open-access database is its facilitation of collaborative and comprehensive research endeavours. The Lundin-CHUV Biobank will be a multi-year project that aims to be a pioneer in data integration by combining both retrospective and prospective data and will include clinic, radiological and molecular data, backed by the Brain Tumour Biobank of the CHUV (led by Professor Monika Hegi). It will aim to bridge existing tissue banks and open international data-sharing that will accelerate the pace of discoveries, enabling large-scale studies, and enhancing the understanding of brain diseases. This shared resource fosters innovation, encourages data sharing, and ultimately contributes to the development of improved diagnostics, treatments, and therapies for neurological conditions like glioblastoma, significantly impacting patient care and outcomes.

UNLOCKING INSIGHTS FROM THE BIOBANK

Prof. Hegi has significantly contributed to the development and enrichment of the Biobank.

Her work involves the strategic collection, storage, and utilization of biological samples obtained from brain tumour patients. These samples, meticulously preserved in the Biobank, serve as invaluable resources for researchers, enabling in-depth analyses and investigations into the molecular underpinnings of brain tumours, particularly glioblastoma.

Prof. Hegi's visionary approach extends to pioneering combination therapies for brain tumours. Her research dives deep into identifying new molecular targets within glioblastoma. By merging different therapeutic agents, such as drugs influencing blood vessel formation, immunotherapies, and targeted treatments, she's forging innovative paths to combat this aggressive cancer. These combination therapies hold promise in elevating treatment effectiveness against glioblastoma, offering hope to patients in their fight against this challenging disease.

Prof. Hegi's work showcases the vital role of the Biobank in fuelling comprehensive research. Her dedication to unlocking the mysteries of brain tumours and her groundbreaking strides in combination therapies highlight a new frontier in brain cancer care, illuminating pathways for enhanced treatments and improved outcomes.

SPOTLIGHT

Prof. Monika Hegi's pioneering research at CHUV

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Prof. Douglas Hanahan

© Ludwig Cancer Research

2 INNOVATIVE COMBINATIONS OF TARGETED THERAPIES AND DRUG REPURPOSING

Led by Prof. Douglas Hanahan, research into innovative combination therapy for brain cancers, particularly glioblastoma, stems from a deep understanding of the vulnerabilities within the intricate systems of brain tumours. Based on insights garnered from published medical reports, this approach involves a multifaceted strategy using anti-cancer drugs to target specific weaknesses identified within the tumour environment. This method combines a drug that disrupts the formation of new blood vessels, vital for tumour growth, with an immune-enhancing agent. What's particularly groundbreaking is the inclusion of an unexpected element – an antidepressant known for its role in altering immune responses.

IMPRESSIVE OUTCOMES

In Prof. Douglas Hanahan's practical experiments using a glioblastoma model, a combined treatment showcased impressive outcomes, significantly surpassing the impact of administering each compound independently.

Significantly, the antidepressant emerged as a crucial factor in reshaping the immune system's functionality, effectively priming it to recognize and combat cancer cells within the brain. Prof. Hanahan's groundbreaking findings from these studies offer promising avenues for innovative therapies in glioblastoma treatment, emphasizing the potential of unconventional combinations in revolutionizing cancer therapies. His work heralds a potential shift towards more effective and targeted treatments for challenging brain cancers like glioblastoma, offering hope for improved outcomes.

Prof. Hanahan's laboratory research program is structured around the use of genetically engineered mouse models (GEMMs) of multistep de novo tumourigenesis to investigate the hallmarks of cancer. Using GEMMs, his team works on novel therapies that target key events of cancer progression, with the aim of hampering the evolution of drug resistance and prolonging response to therapy.

Prof. Hanahan also explores the multiple mechanisms of immune-evasion employed by tumours and strategies to disable such defences to boost immunotherapy and broaden its applicability.

3 INNOVATIVE PREPARATORY RESEARCH PROJECTS

The collaboration between the Lundin Cancer Fund and CHUV enabled the initiation of several projects that have been identified and selected among 14 submissions for their potential to lead to key findings that may change our understanding of glioblastoma or provide improvements in the management of patients. After a rigorous initial selection process by the internal council of the Lundin Family Brain Tumour Centre, three grant winners were selected by the members of the centre's external scientific advisory board. The three research grants, each consisting of $100,000 Swiss Francs (CDN$155,000), were awarded to:

1) Prof. Johanna Joyce 2) Prof. Denis Migliorini 3) Dr. Giulia Cossu

NEW AVENUES IN BRAIN CANCER TREATMENT

Glioblastoma is a formidable brain tumour, often proving resistant to traditional treatments. But what if we shift our focus from just targeting cancer cells to understanding the whole environment where these tumours thrive?

Prof. Joyce's Ludwig Institute for Cancer Research specializes in studying the microenvironment around tumours, focusing on how non-cancerous cells like immune and stromal cells impact tumour growth, spread, and responses to treatment. The institute has identified crucial signals from normal tissue cells and immune cells that regulate cancer cells, revealing how cancer cells manipulate these normal cells to intensify tumour aggressiveness.

Scientists have delved into what's known as the tumour microenvironment (TME) in glioblastoma. It's not just about the cancer cells; it's about the supportive cast – immune cells and blood vessels – that the tumour recruits to sustain its growth.

Combining treatments that target blood vessels with immunotherapy holds promise. By teaming up these strategies, we aim to activate the body's immune system to identify and combat the tumour cells.

In a groundbreaking project, our team not only seeks to understand the blood vessel makeup in brain tumours but also aims to uncover potential new therapies.

SPOTLIGHT

Prof. Johanna Joyce, full member of the international Ludwig Institute for Cancer Research (CHUV)

Dr. Giulia Cossu,
neurosurgeon, CHUV

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SPOTLIGHT

HYPNOSIS: REVOLUTIONIZING AWAKE BRAIN SURGERY

The main goal of brain tumour surgery is not just to remove the tumour but also to protect vital brain functions. To achieve this delicate balance, surgeons need to identify and map crucial brain areas during the operation.

Dr. Giulia Cossu, a neurosurgeon at CHUV, has expertise in pioneering surgical techniques particularly in epilepsy and brain tumour surgeries involving critical brain areas.

Awake brain surgery, where patients stay conscious during the procedure, has transformed our understanding of the brain's inner workings. This technique helps map the brain's functions in real-time and has shown positive effects on patient survival rates.

Traditionally, anesthesia for awake brain surgery uses sedative drugs, causing stress and discomfort for patients. In response, researchers are exploring hypnosis as an alternative during awake brain surgery. At CHUV, hypnosis has been introduced as an anesthesia method since 2021, showing promising results.

Dr. Cossu's research project seeks to show hypnosis during brain surgery can reduce stress levels, enhancing patient comfort. The research initiative will measure stress using psychological evaluations and physiological measurements like heart rate and brain wave recordings.

The project's goal is to identify the anesthesia method that offers the most comfort and minimizes stress for brain tumour surgery patients.

SPOTLIGHT

CELL THERAPY: EMPOWERING THE IMMUNE SYSTEM

Glioma is an umbrella term for cancer of the glial cells that surround nerve endings in the brain. Glioblastoma is a type of glioma. Glioma poses immense challenges in treatment. The standard methods – surgery, radiotherapy and chemotherapy – have limited success in extending patient survival. However, a new ray of hope has emerged through cell therapy, a form of immunotherapy that utilizes the body's own immune system to fight cancer.

Cell therapy focuses on using a patient's immune cells, specifically T lymphocytes (T cells), which have the ability to target and destroy abnormal cells. These T cells are modified in a lab to recognize and attack tumour cells. One such method, called CAR T-cell therapy, transforms T cells by inserting an antibody that identifies the tumour, directing the T cells to attack the specific cancer target.

Prof. Denis Migliorini has spearheaded early phase trials exploring immunotherapy for glioblastoma and has expertise in synthetic biology and T cell engineering, vital for CAR T-cell technology development.

Prof. Migliorini's team will test and refine this approach using a mouse model of glioma. If successful, the plan is to move into clinical trials for patients with glioma. This project holds the potential to introduce a groundbreaking treatment that could enhance patient survival and quality of life.

Prof. Denis Migliorini, Department of Oncology, University of Geneva

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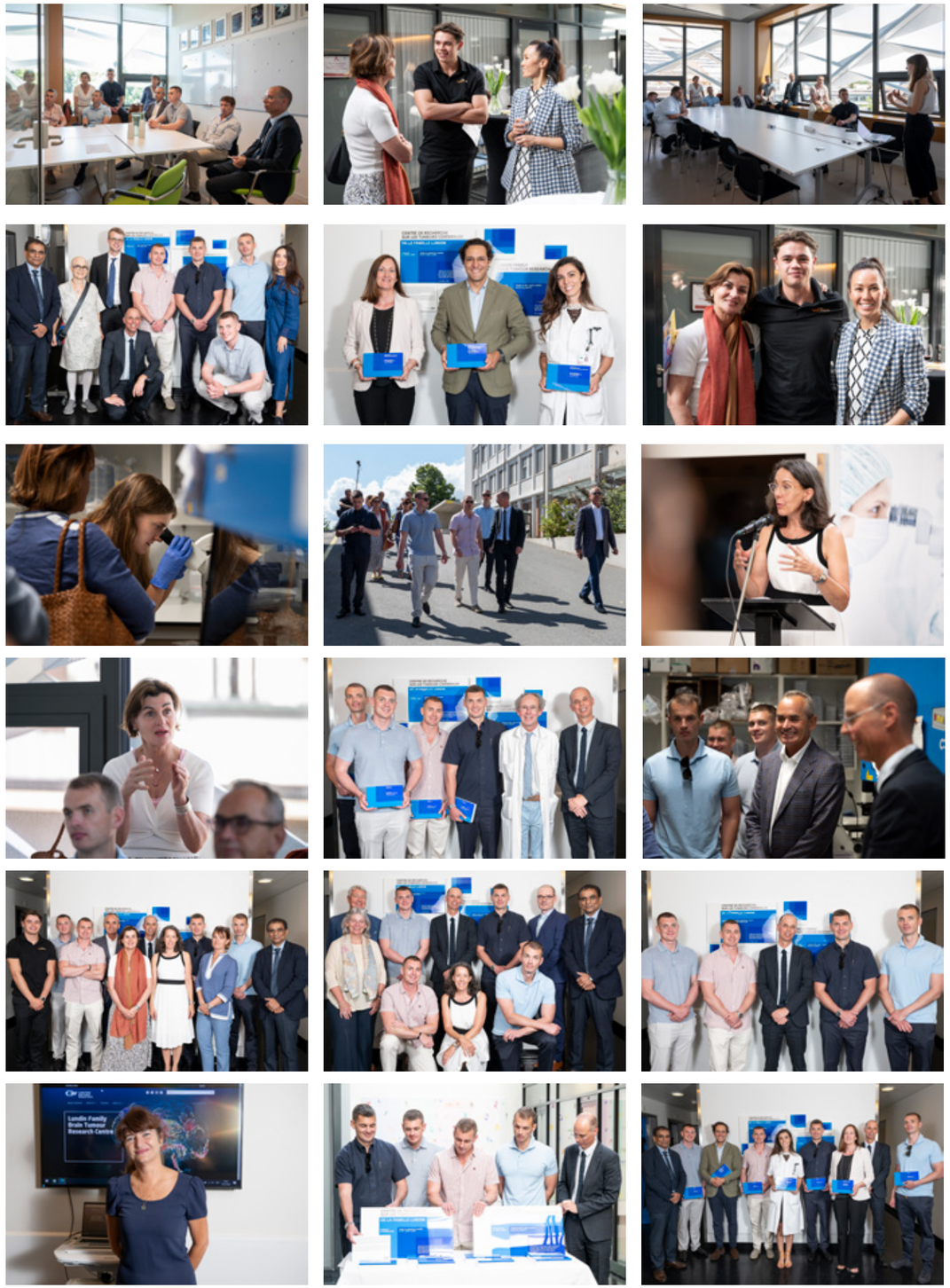

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PEER-REVIEWED LEADING RESEARCH

The Lundin Brain Tumour Research Centre includes a support platform that assists physicians and researchers in their scientific work on brain tumours. This support is highlighted by the affiliation of the researchers to the Lundin Family Brain Tumour Research Centre in the publications of their research work.

In 2023, 10 publications were published in peer-reviewed renowned medical journals, including:

- *New England Journal of Medicine*
- *European Journal of Cancer*
- *Investigational New Drugs*
- *Nature Cancer*
- *Cell Report Medicine*
- *Nature Cancer and Neurology*


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