Light Meets Precision: EIC Pathfinder Project SCALPEL Pioneering a Revolutionary Photoimmunotherapy for Cancer

Multi-million Euro research initiative harnesses light to 'click' antibodies to cancer cells paving the way for a potentially curative treatment and revolutionising modern oncology.

Oslo 19 March 2025 – In a groundbreaking effort to revolutionise modern oncology, the SCALPEL project launches a Europe wide initiative aimed at redefining cancer treatment by using light to precisely 'click' tags to cancer cells, enabling the immune system to recognise and destroy them with unparalleled accuracy. The multidisciplinary initiative funded by the European Innovation Council Pathfinder programme under Horizon Europe with a total budget of more than EUR 4 million aims to revolutionise modern oncology offering new hope for millions worldwide.

According to the World Health Organization (WHO), cancer remains one of the leading causes of death, with 20 million new cases worldwide in 2022. Despite advancements in surgery, chemotherapy, radiotherapy and immunotherapy, no existing treatment has been able to fully eradicate the disease. Current chemotherapeutic regimes are not curative due to a lack of specificity, and cancer cells can develop drug resistance due to their prolonged exposure to drugs. Chemotherapy and its side effects take an emotional and physical toll on the patients' quality of life as well as their families and loved ones. Financial costs of treatment also pose an extra burden and add to an already challenging time.

SCALPEL: Lighting up a new era of cancer treatment

This is where the newly launched SCALPEL project clicks in. SCALPEL is set to change the cancer treatment landscape through an innovative fusion of photomedicine and immunotherapy.

In describing the significance of SCALPEL, Project Coordinator Dr Theodossis Theodossiou from Oslo Universitetssykehus HF used the classic fairytale of the mice and the cat as an analogy: "In order to protect themselves from the cat, the mice hung a bell on its tail so they could hear it coming and hide. In SCALPEL we are doing the same thing. We are attempting to hang or attach 'bells' to surviving cancer cells with the use of photomedicine and click chemistry so like the cat, they can easily be identified by the body's immune system and destroyed."

He continued, "This approach is very important to ensure that we can target and eliminate any remaining cancer cells which survived the initial photomedical treatments and ensure long-term remission and a potentially curative outcome for patients."

SCALPEL is pioneering a dual-action approach that not only destroys cancer cells but also ensures no malignant cells are left behind while training the immune system to recognize and attack cancer cells in the future. In the first phase of the therapy, light-activated treatments known as Photodynamic Therapy (PDT) and Photochemical Internalization (PCI) are used to kill the bulk of the tumour cells. However, some sublethally damaged cancer cells may survive leading to recurrence. The next phase is where SCALPEL's breakthrough happens. Specially engineered antibodies with clickable ends are introduced. When exposed to light therapy, these antibodies selectively flag the remaining cancer cells for immune destruction. This targeted therapy is expected to eliminate the remaining cancer

cells completely while leaving healthy cells unharmed. Most importantly, this process will train the immune system to recognize and attack cancer cells in the future, potentially offering a long-term cure through abscopal immunity.

A High-Risk, High-Reward Innovation

In order to bring this vision to life, SCALPEL has brought together a multidisciplinary team of experts in photomedicine, immunology, synthetic chemistry, porphyrin chemistry and protein engineering from five European countries.

Returning to the cat and mouse analogy, Theodossis elaborated on the multidisciplinary nature of the SCALPEL partners: “One single discipline cannot complete the task alone. This is a synergistic task. We need people to construct the bells, a team to design and construct the ribbons for the bells, experts to test the bell before the operation, people to put together the bell and the ribbon, specialists to work on the ‘cat’s tail’ for the bell to be attached and experimentalists to hang the bell among others.”

He concluded, “We have gathered hand-picked, highly specialised scientists from across Europe who will work side by side, each bringing their own expertise, ensuring the highest level of competence to complete the task at hand.”

While ambitious, the project’s potential impact on oncology is groundbreaking — introducing a potentially curative photoimmunotherapy that targets cancer with unprecedented precision. By leveraging light and immunotherapy, SCALPEL is redefining cancer treatment by turning light into a powerful weapon against cancer with just a click.

The SCALPEL project officially kicks off its activities with a consortium meeting in Oslo, Norway, on 21st March 2025.

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Key Facts

Full Name: Specific Conjugation of Antibodies to Lipid Photo-peroxidised cancer tissues for their immunogenic Elimination
Start Date: 01.03.2025
Duration: 54 months
Budget: EUR 4,554,301 million
Coordinator: Dr Theodossis Theodossiou, Oslo Universitetssykehus HF
Website: www.scalpel-project.eu
LinkedIn: SCALPEL-Project

Project Partners

Norway
- Oslo Universitetssykehus HF

Greece
- Ethniko Kai Kapodistriako Panepistimio Athinon

France
- PorphyChem
- Institut Gustave Roussy

Germany
- EURICE - European Research and Project Office GmbH

Slovenia
- Kemijski Institut

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About EIC Pathfinder
The EIC Pathfinder is a funding programme under Horizon Europe that offers support to research teams by funding research to develop the scientific basis to underpin breakthrough technologies; support the earliest stages of scientific, technological or deep-tech R&D; aim to build on new, cutting-edge directions in science and technology to disrupt a field and a market or create new opportunities; realise innovative technological solutions to identify, develop and scale up breakthrough technologies and disruptive innovation in Europe.

More here: https://eic.ec.europa.eu/eic-funding-opportunities/eic-pathfinder_en

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