European Innovation Council Funded by the European Union

POLITECNICO MILANO 1863

PRESS RELEASE

LUMINA launches to develop “digital twins” that support more personalised lung cancer diagnosis and treatment

An international research consortium has received €4 million in funding from the European Innovation Council (EIC) under the highly competitive EIC Pathfinder Challenges programme to develop a new generation of AI-based clinical decision-support tools for lung cancer care.

The project, LUMINA (Lung Modeling and Intelligence for Advanced Care: A Digital Twin Approach to Lung Cancer Diagnosis and Treatment), will create patient-specific “digital twins” of the lungs that model lung cancer growth dynamics to enable predictive diagnosis and personalised treatment selection.

It will integrate generative AI-based techniques with medical knowledge in lung cancer care to turn this concept into clinical impact.

Clinicians will benefit from LUMINA's analysis of longitudinal imaging and clinical data, enabling more proactive, personalised, and data-driven treatment decisions, while patients will gain access to their digital twin, enhancing transparency in their care pathway.

Turning longitudinal patient data into predictive, patient-specific insights

Lung cancer is often detected late. However, predictive diagnosis is challenging, particularly for patients lacking traditional risk factors and when CT screening shows no clear signs of a tumour. Treatment choices are also difficult when patients’ conditions are rare and do not fit standard guidelines for treatment selection.

LUMINA addresses these challenges by modelling how the disease evolves over time and by generating predictions that clinicians can use to guide follow-up and therapy decisions.

At the core of LUMINA is an attention-based AI architecture designed to connect longitudinal and multimodal patient data, including CT scans, electronic health records, laboratory results, and treatment history, to model tumour growth and individual treatment response. By doing so, it aims to fill knowledge gaps in lung cancer care.

A key enabler of LUMINA is its strong anchoring in real-world data. LUMINA is built around a core dataset of approximately 4,000 patients sourced from hospitals in Denmark, Italy, Poland, and South Korea. Later in the project, the dataset will be expanded – among other approaches – via synthetic data generation to more than 10,000 patients.

From research to innovation and future clinical impact

The consortium emphasises that LUMINA is designed to move beyond proof of concept by developing the scientific and technological foundations for groundbreaking innovation in cancer care.

“The grant we have now received is just the first of several steps towards a solution that – if progress continues successfully – could be implemented and significantly improve lung cancer treatment within 10–15 years,” says **Professor Izabela Ewa Nielsen**, Project Coordinator and Portfolio Manager, **Aalborg University.**

This long-term perspective is central to Politecnico di Milano’s role in LUMINA. Drawing on its consolidated expertise in research on digital health innovation and medical technologies, as well as on its experience in interdisciplinary European projects, the Value-Based Innovation in Health Care Group **will assess the conditions under which the project’s technological advances can generate value in real healthcare settings**. Through Health Technology Assessment (HTA), the Group will evaluate clinical utility and effectiveness, economic viability, organisational implications and long-term sustainability, while also addressing the ethical, governance and policy dimensions needed to support transparent, trustworthy and responsible adoption.

“For an innovation such as LUMINA, technical performance is only the beginning. We work with partners to define, from the outset, the evidence needed to demonstrate value for patients, clinicians, healthcare organisations and society. By integrating Value-Based Health Care and Health Technology Assessment into the development process, **we help turn promising technologies into solutions that are clinically meaningful, economically sustainable and ready to be adopted in real care pathways**”, says **Professor Emanuele Lettieri**, Leader of the Dissemination, Exploitation, IP and Communication Work Package, **Politecnico di Milano**.

“Our Group’s mission is to make innovation improve people’s lives and strengthen Europe’s life-sciences ecosystem. In LUMINA, **we will work alongside clinicians, healthcare leaders, regulators and patient representatives to anticipate the organisational, ethical and policy conditions for responsible adoption**. This is how we help innovators, public and private, move from a compelling idea to a trusted solution with measurable impact”, says **Maria Pinelli, Assistant Professor** and Co-Leader of the Dissemination, Exploitation, IP and Communication Work Package, **Politecnico di Milano**.

LINK TO THE PHOTOGALLERY

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Factsheet – LUMINA:

Programme & funding: EIC Pathfinder Challenges – challenge area "Generative-AI based agents to revolutionise medical diagnosis and treatment of cancer". LUMINA is one of seven funded projects in the challenge area, selected from 219 submitted proposals (total allocation: €30 million). LUMINA receives €4 million.

Timeline: 2026–2030 (48-month project).

Coordinator: Aalborg University (Denmark).

Consortium partners:

- Aalborg University (AAU), Denmark – Project Coordinator and Portfolio Manager
- Humanitas Research Hospital / Humanitas AI Center (ICH), Italy
- Politecnico di Milano (POLIMI), Italy
- Cracow University of Technology (PK), Poland
- Maria Skłodowska-Curie National Research Institute of Oncology (MSCNRIO), Poland
- Region Hovedstaden (REGIONH), Denmark

Planned activities (high-level):

- Collecting and preparing clinical data across hospitals
- Developing a data and integration platform to link multiple data types
- Building digital twins that predict disease progression and treatment response
- Validating prototype components in controlled lab settings
- Integrating validated modules into an open platform and delivering functional prototypes
- Communicating results while planning future implementation pathways