the Pontifical Academy of Sciences

Final Statement of the Workshop on Cancer Research, Healthcare and Prevention: Structuring translational research to increase innovation and reduce inequalities

Based on the Conference by the Pontifical Academy of Sciences (PAS) and the European Academy of Cancer Sciences (EACS) at Casina Pio IV, Vatican City, May 22-23, 2025*

Abstract

This conference explored strategies to structure translational cancer research in order to increase its effectiveness, innovation and reduce global inequalities. Despite major advances in cancer biology that have reduced mortality in high-income countries, significant disparities persist across and within countries, driven by disparities in care, as well as systemic and socioeconomic barriers, and the fact that most patients still die from their disease. The conference emphasized the need for a fully integrated research continuum—linking basic science, clinical research to application, and real-world outcomes—to make more scientific progress and ensure all patients´ benefit from this progress. Key priorities include expanding Predictive, Preventive, Personalized, and Participatory Cancer Medicine (P4CM); strengthen infrastructures, and most importantly Comprehensive Cancer Centers (CCCs); addressing personal data-driven health, digital health and AI opportunities while continuing to strongly support more traditional areas of cancer research; and embedding health economics and implementation science. A shift toward publicly funded, mission-driven research was strongly recommended to counterbalance commercial dominance, align cancer innovation with quality improvement, equity goals, and because prevention and screening research does not usually attract commercial support. The importance of international collaboration, data interoperability, early detection/intervention and culturally tailored care was

underscored, with a strong emphasis on data interoperability to ensure the efficiency and effectiveness of cancer research. By investing in prevention, early detection and interception, quality of life, and equitable access, the global cancer research agenda can become a model of solidarity, sustainability, and ethical responsibility.

Purpose and Findings

Purpose of the Conference

The increasing knowledge of cancer biology and technical progress in the last few decades set the stage for more effective translational research, covering all therapeutics/care and prevention strategies. This conference aimed to analyze and discuss how to structure cancer research to continue to make progress against this disease and how its early detection/intervention and optimization of treatment can at the same time reach all patients across geographic regions, reduce inequalities, and ensure access to the critical mass of patients and biological information required for translational cancer research. The overarching goal is a long-term strategy that simultaneously increases innovation and reduces inequality, through evidence-based and cost-effective prevention and therapeutics/care, ensuring improved quality of life and equitable outcomes for all cancer patients.

Uneven Progress and Global Cancer Burden

While we recognize significant scientific progress, its distribution remains highly uneven—between global north and south, and within individual nations and regions. Cancer continues to escalate as a global health crisis with currently already about 20 million new cases and about 10 million deaths annually. Disparities in care and outcomes, driven by socioeconomic and systemic inequalities, persist. A core finding is the opportunity for global learning and action in prevention, diagnostics, cure, vaccination, and research funding to close these gaps.

A Multi-Actor Task for Science, Innovation and Moral Responsibility

The scale and complexity of cancer demand collective action across sectors: from basic and clinical scientists to policymakers, healthcare providers, patients, patient advocates, and religious and moral communities. Religious communities, in particular, can play a significant role in moral discourse, providing a voice for the poor and excluded, and fostering ethical frameworks for action. It is in this collaborative spirit that they can foster ethical frameworks for action, ensuring that everyone is engaged and involved in the process.

Digital Health, Data and AI Opportunities

The transformation to data-driven cancer medicine is underway. The integration of artificial intelligence and digital platforms across the cancer continuum—from digital pathology to remote tumor boards—offers vast potential, while also recognizing that traditional areas of cancer research need to continue to be strongly supported. However, challenges like digital inequity, fragmented systems, security and fair access, and underinvestment must be addressed. A major

priority is building infrastructure for interoperability, biobanking, omics technologies, and real-world data integration. Registry-based randomized clinical trials (R-RCTs) and patient-reported outcome measures (PROMs) must be scaled.

Translational Cancer Research and the P4CM Model

Basic science is the driving force behind impactful translational research. Translational cancer research must span the full continuum: from preclinical disease insights and early diagnosis to implementation and outcomes research. We emphasize the development of Predictive, Preventive, Personalized, and Participatory Cancer Medicine (P4CM) as a strategic framework. Efforts should include early diagnosis /intervention, reverse translation, liquid biopsy technologies, development of technologies which can be utilized world-wide, and data science-based innovations. The key goals include reducing cancer incidence and early detection and reversal that also reduces mortality, increasing cure rates, extending survival, and improving health-related quality of life. Prevention remains underfunded despite its potential to reduce incidence dramatically. The same applies for early detection which has significant potential to increase cures rates with treatments available today. Cancer is a complex disease that perturbs multiple normal systems (e.g. angiogenesis, metabolism, inflammation, etc.) and in the future targeted multimodal therapies are going to become an essential approach for cures. Quality of life and palliative care research need much greater visibility and economic support. To bridge the growing gap between innovation and real-world delivery, it is crucial to focus on operational and implementation science, which can help translate research findings into practical applications.

Comprehensive Cancer Centers (CCCs) as Structural Backbone

CCCs are pivotal to organizing research, care, and education. They provide a structural model for excellence across the cancer continuum, integrating high-quality care with research and outcomes measurement. The expansion of CCCs and their accreditation (such as OECI, CCCoE) is crucial, especially in the context of the EU-supported goals of increasing CCCs from ~50 to ~100. Expansion of CCCs must continue. EU-supported goals of increasing CCCs from ~50 to ~100 are crucial. Collaboration across CCCs—including twinning programs and coordination with regional hospitals— is vital to ensure every patient benefit from scientific progress. National platforms like Germany's DKTK and "One NCT" with its OCT² clinical trial program exemplify seamless pipelines from lab to bedside, with international review, fast-track implementation, and strong patient involvement. Internationally expanding consortia of CCCs are represented by Cancer Core Europe and Cancer Prevention Europe. These should be expanded globally whenever they fit to the national or regional structures of health care organization and promise better access of all citizens to optimal care.

Equity and Global Disparities

Inequities remain a central issue in cancer care. Efforts must include strengthening primary health systems, decentralizing services, expanding insurance literacy, and training the next generation of researchers and health care providers. Globally, HPV, HBV, and HCV-related cancers—especially

in Africa—require urgent action through vaccination, screening, antivirals, and policy reform. Europe should lead by example, ensuring equitable access across all member states and supporting regions with unmet needs collaborative networks. Also, in translational cancer research great inequalities exist, with negative consequences for developing modern integrated research/care systems.

Funding Models and Economic Challenges

The current funding environment does not adequately support the full translational research continuum. Most funding comes from for-profit entities, particularly the pharmaceutical industry, which limits academic agenda-setting and limits research oriented towards prevention and screening. While public investment has doubled since 2005, for-profit funding has increased tenfold, now accounting for ~60% of total global cancer research spending. We call for a shift towards mission-driven public and philanthropic funding models that prioritize equity and translational outcomes over short-term commercial returns.

Critical Mass and International Collaboration

The complexity and fragmentation of cancer biology and patient diversity require large-scale, collaborative efforts. No single institution can independently sustain the research needed for stratified, personalized care. International and global networks must coordinate clinical trials, infrastructure development, and digital tools like robotic diagnostics tools. At hemispheric levels, such as for Europe and the other mega regions, regional Cancer Institutes with a coordinating mission, bringing together current and emerging research and care institutions, and sustainable funding are essential.

Research Agenda and Priorities

- Advance Predictive, Preventive, Personalized, and Participatory (P4) Cancer Medicine:
  - Early prediction/intervention (when the cancer perturbations are less complex), predictive risk factor modelling and omics-based stratification and early detection
  - Personalized medicine, surgery and radiation based on molecular and imaging diagnostics
  - Combination therapies and immunotherapies for early and advanced disease stages
  - Real-world evaluation of balanced anti-tumor and supportive care approaches
  - Multimodal therapeutic approaches to cancer to deal with this entity as complex multifaceted diseases
- Accelerate Prevention Research and Support Implementation Research:
  - Focus on individual as well as population-based screening strategies and vaccine development
  - Implement digital health interventions to scale access and reduce disparities

- Strengthen implementation to widely and equitably disseminate current and future standard of care

· Embed Health Economics and Outcomes Research:

- Evaluate cost-effectiveness from early-stage development
- Standardize the use of PROMs for all patient pathways

· Infrastructure Development:

- Scale and accredit CCCs across all regions to improve access of patients to high quality care.
- Establish CCCs of Excellence with advanced data science, omics, and AI capabilities.
- Foster interaction with basic/preclinical centers and regional hospitals

· Ensure Equity:

- Conduct systematic research on geographic and socioeconomic disparities
- Promote culturally tailored care and prevention
- Lower costs and increase access to key diagnostics and treatments in low-resource settings

Recommended Actions

1. Address the challenges of universal cancer equity to improve the chances of longer quality survival time

- Sustain Curiosity-Driven Basic Research and support fundamental research that seeds future breakthroughs.
- Address the fact that access to quality cancer treatment is the privilege of those who can afford private health insurance
- Integrate underserved populations in all clinical and prevention trials.
- Promote operational and implementation science to ensure delivery.

2. Establish a Fully Integrated Translational Research Continuum

- Increase government spending on comprehensive cancer treatment and research
- Fund broadly cancer related basic science, translational projects and investigator- initiated trials.
- Support reverse translation, biomarker discovery, and digital tool integration (AI, PROMs).
- Focus resources on early detection/intervention of cancers
- Emphasize the power of multimodal therapeutic approaches to cancers as a complex disease.

3. Strengthen CCC Networks and National-Regional Platforms

- Increase the number and regional reach of accredited CCCs.
- Promote models like “One NCT” and international networks of CCCs to ensure rapid translation.

4. Advance Implementation and Health Economics Research

- Fund real-world outcome research and cost-effectiveness assessments.
- Embed economic evaluation in all phases of translational research.

5. Promote European and Global Consortia

- Foster global collaboration on trials, resource-sharing, and technology access.
- Develop secure, interoperable platforms for cross-border patient data and diagnostics.

6. Create Enabling Policy and Funding Frameworks

- Shift funding balance toward public and not-for-profit institutions.
- Establish mission-driven research agendas with dedicated EU coordination.
- Encourage philanthropic investment in equity-based cancer research.

7. Embed Education, Patient-Centricity, and Advocacy

- Improve awareness raising and education on cancer
- Build education modules within CCCs for next-generation scientists and clinicians.
- Empower patients as research co-creators in governance and design.
- Expand the use of PROMs and their integration into clinical workflows.

Conclusion

We call for a cohesive, equitable, and innovative cancer research and care agenda—anchored in basic and translational science, global solidarity, and ethical commitment. By embedding prevention, outcomes, health-related quality of life and health economics research at the core, we aim to reshape the cancer landscape globally. Achieving this will require sustainable funding, structural reform, and a shared vision that unites us all in our commitment to the dignity and well-being of every patient.

* The conference was guided and supported by the Pontifical Academy of Sciences (PAS) and the European Academy of Cancer Sciences (EACS), and additional support to the conference from the Danish Cancer Society, the Embassy of Sweden to the Holy See, and “la Caixa” Foundation is gratefully acknowledged.

List of Participants

Prof. Joachim von Braun
PAS President, the Pontifical Academy of Sciences, and Bonn University, Germany

Prof. Michael Baumann
EACS President and Chairman and Scientific Director, German Cancer Research Center, Heidelberg, Germany

Prof. Ulrik Ringborg
EACS, Cancer Center Karolinska, Stockholm, Sweden

His Eminence Cardinal Peter K.A. Turkson
Chancellor, the Pontifical Academy of Sciences, Vatican City

Msgr. Dario E. Viganò
Vice Chancellor, the Pontifical Academy of Sciences, Vatican City

Dr. Nancy Abou-Zeid
Scientific Director, Fondation ARC, France

Prof. Tit Albreht
Head of Centre / Senior Researcher, National Institute of Public Health of Slovenia

Prof. Vanderlei Bagnato
PAS Academician and Faculty, University of Sao Paulo-Brasil and Texas A&M University, USA

Dr. Anton Berns
Netherlands Cancer Institute

Prof. Christian Brandt
Director, UCT University Cancer Center Frankfurt, University Hospital Frankfurt, University Cancer Center, Frankfurt, Germany

Prof Julio Celis
EACS, Cancer Center Karolinska, Stockholm, Sweden

Prof. Chien-Jen Chen
Academician and Council Member, Pontifical Academy of Sciences and Academia Sinica, Taiwan

Dr. Helen Croker
Assistant Director of Research and Policy, World Cancer Research Fund International, London, UK

Dr. Massimiliano di Pietro
Senior Clinical Scientist, Early Cancer Institute, Cambridge, UK

Prof. Manjit Dosanjh
Visiting Professor, Department of Physics, University of Oxford, Oxford, UK

Dr. Joanna Drake
Deputy Director-General of the European Commission’s Directorate-General (DG) for Research and Innovation, Brussels, Belgium

Prof. Thomas Dubois
Head of European and International Affairs, French National Cancer Institute, INCa, France

Prof. Alexander Eggermont, M.D., Ph.D.
Professor of Immunotheraphy, University Medical Center Utrecht, Netherlands

Prof. Angelika Eggert
Director, Dept. of Pediatric Oncology + Director, Translational Cancer Medicine, Charite, Berlin, Germany

Prof. Ingemar Ernberg
Karolinska Institutet, Sweden

Prof. Sara Faithfull
Adjunct Professor Discipline of Radiation Therapy, Trinity College Dublin, University of Dublin, Ireland

Dipl.-Ing. Johannes Förner
DKFZ German Cancer Research Center, Heidelberg, Germany

Prof. Dr. Stefan Fröhling
Managing Director NCT Heidelberg, Head of Translational Medical Oncology, DKFZ, NCT Heidelberg, Germany

Prof. Manuel Heitor
IN+ @ IST, University of Lisbon, Portugal

Per Holmström
Swedish Ambassador to the Holy See

Dr. Leroy Hood, M.D., Ph.D.
President, Institute for Systems Biology, Affiliate Professor, Immunology, University of Washington, Seattle, USA

Prof. Bengt Jönsson
Professor emeritus, EACS and Department of Economics, Stockholm School of Economics, Sweden

Ma Jun
SunYatSen Cancer Center Guangzhou, China

Dr. Ravi Kannan
Director, Cachar Cancer Hospital and Research Centre, Assam, India

Prof. Klas Kärre
Secretary General, European Academy of Cancer Sciences, Stockholm, Sweden

Prof. Maria Leptin
President, European Research Council, Brussels, Belgium

Prof. Peter Lindgren
Managing Director, The Swedish Institute for Health Economics

Dr. Douglas Lowy
Principal Deputy Director of National Cancer Institute, NIH, USA

Dr. Per Magnus Mæhle
Coordination team member, EUnetCCC / Oslo University Hospital CCC, Norway

Prof. Sir Alexander Markham
Emeritus Professor of Medicine, EACS and University of Leeds, UK

Prof. Mads Melbye
Director, Danish Cancer Institute, Denmark

Prof. Péter Nagy
Scientific Director, National Institute of Oncology, Hungary

Simon Oberst
Director of Quality and Accreditation, OECI, Brussels, Belgium

Mrs. Maria Palmquist
Cancer Center Karolinska, Stockholm, Sweden

Prof Iqbal Parker
Professor, University of Cape Town, South Africa

Dr. Danielle Rodin
Radiation Oncologist, Clinician-Scientist, Princess Margaret Cancer Centre, University of Toronto, Canada

Patrik Rossi MD, PhD

Managing Director, Chairman Board of Directors KCCC Karolinska Comprehensive Cancer Center, Cancer Theme, Karolinska University Hospital. Stockholm, Sweden

Prof. Kevin Ryan
Editor-in-Chief, Molecular Oncology, Molecular Oncology, FEBS

Dr Joachim Schüz
Head of Research Branch, International Agency for Research on Cancer (IARC/WHO), Lyon, France

Prof. Richard Sullivan
Director, Institute of Cancer Policy, King's College London, UK

Dr. Josep Tabernero M.D., Ph.D.
Head of the Medical Oncology Department, Vall d'Hebron University Hospital, Vall d'Hebron Insitute of Oncology (VHIO), Barcelona, Spain

Ms. Kim Tiede
EU Project Manager German Cancer Aid, Bonn

Dr. Marc van Bulcke
Sciensano Brussels, Belgium

Ms. Ingrid van den Neucker
Executive Director – Science Policy, European Academy of Cancer Sciences (EACS)

Olivér Várhelyi
European Commissioner for Health and Animal Welfare, Brussels

Prof. Harold E. Varmus
Lewis Thomas Professor of Medicine, Weill Cornell Medicine, New York, NY, USA

Dr. Christina von Gertten
EACS Coordinator, European Academy of Cance Sciences, Stockholm, Sweden

Dr. Elisabete Weiderpass, M.D., Ph.D.
Director, International Agency for Research on Cancer/WHO, Lyon, France

Nils Wilking MD PhD
Karolinska Institutet Stockholm, Sweden