EUROPEAN UNION

LUCIA

LUng Cancer-related risk factors and their Impact Assessment



LUCIA: Understanding Lung Cancer related risk factors and their Impact Assessment

Dr. Alba Garin-Muga (VICOMTECH)

5 years Cancer Mission:
Stronger Through Connection

BRUSSELS
29 SEPTEMBER – 01 OCTOBER

Funded by
the European Union

The LUCIA project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement no. 101096473. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or the Health and Digital Executive Agency. Neither the European Union nor the granting authority can be held responsible for them.

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January 2023 – December 2026 (48M)

3226 prospective participants in the LUCIA study

20 Partners

4 Medical centers

9 Countries

AIM to build a toolbox for discovering new lung cancer risk factors, analyzing personal, external, and cellular domains.

VALIDATION will occur in 3 clinical use cases: population screening, precision screening, and digital diagnostics.

IMPACT: Evidence will inform policy for LC screening programs.

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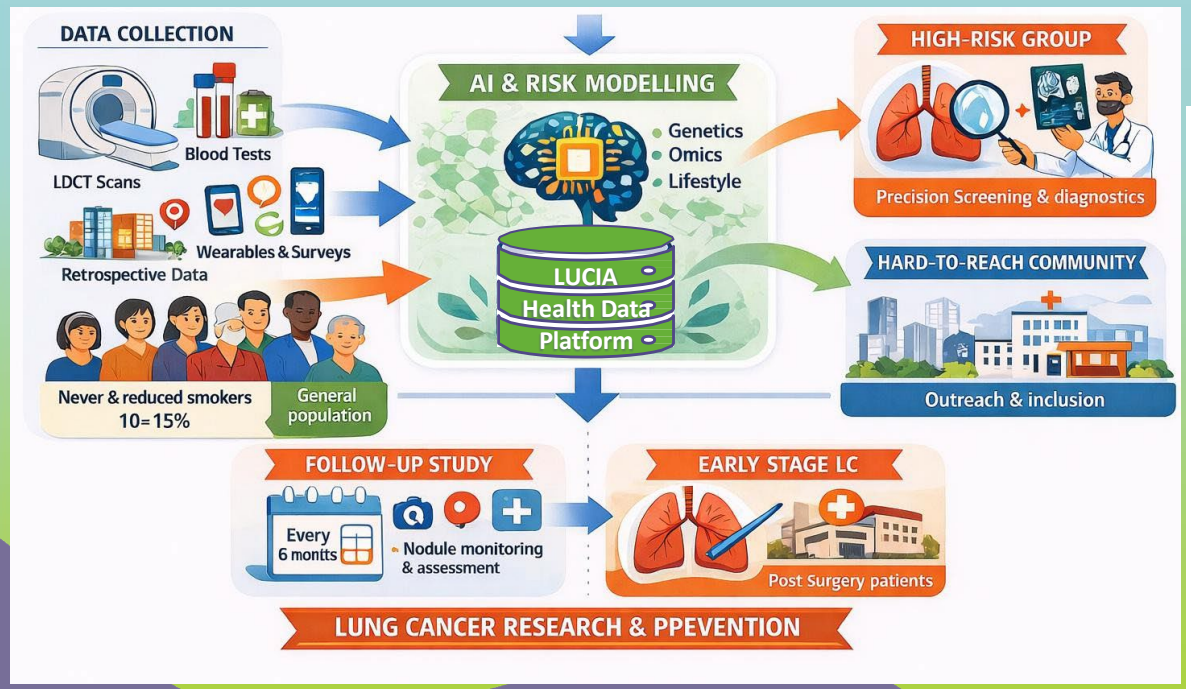
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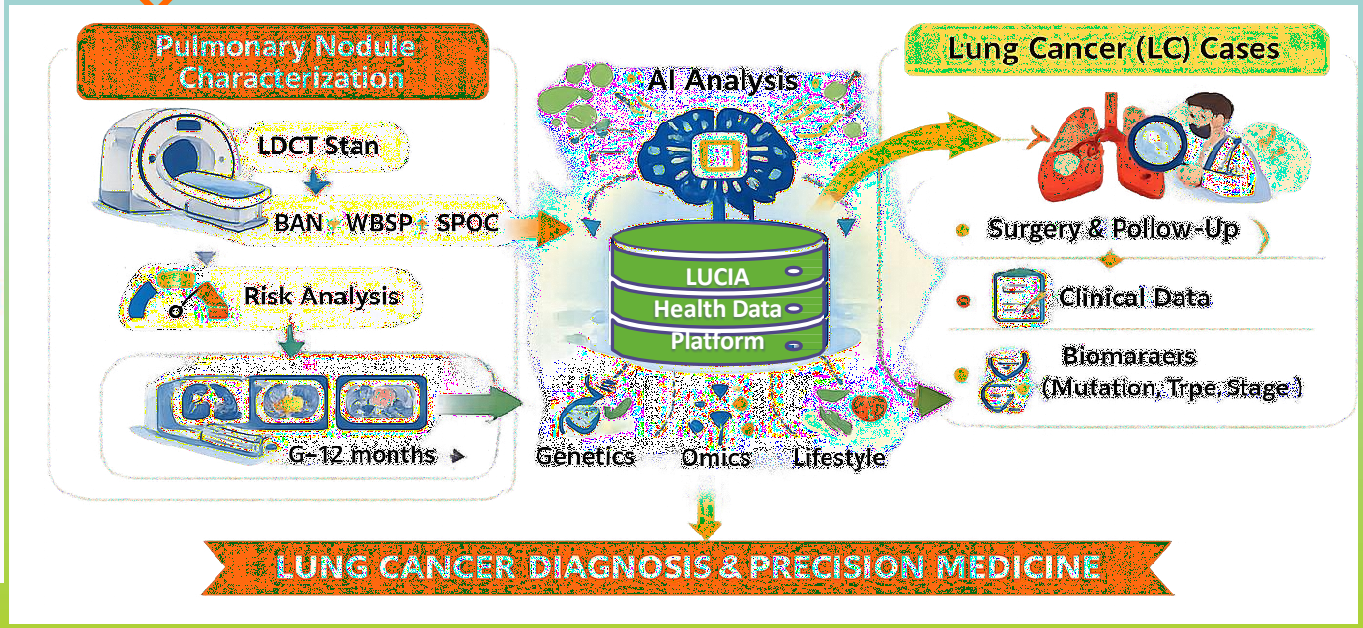


PROSPECTIVE STUDY DESIGN

Phase 1: POPULATION SCREENING



High risk group



Phase 2: PRECISION SCREENING & Phase 3: DIGITAL DIAGNOSTICS

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PROSPECTIVE STUDY RESULTS

Multimodal Data Cohort, N=3,226 total

- **3,226** Clinical & Lifestyle eCRF
- **Sensors: 2,783** BAN | SPOC | 681 WBSP
- **2,223** LDCT Scans
- **2,365** Multi-Omics Samples

Risk Stratification Breakdown



Clinical Detection Outcomes

- **350** Total Lung Cancer Patients
- **General Population (OSA):** 4 Lung Cancers & 450 Pulmonary Nodules Detected
- **High-Risk Cohort (SAS, CHUL, LAT):** 65 Lung Cancers Detected
- **Clinical Consultations:** Oncology, Pneumology & Thoracic Surgery Recruitment

STUDY POPULATION IN LUCIA

FEMALE 1779 (55%)

MALE 1447 (45%)

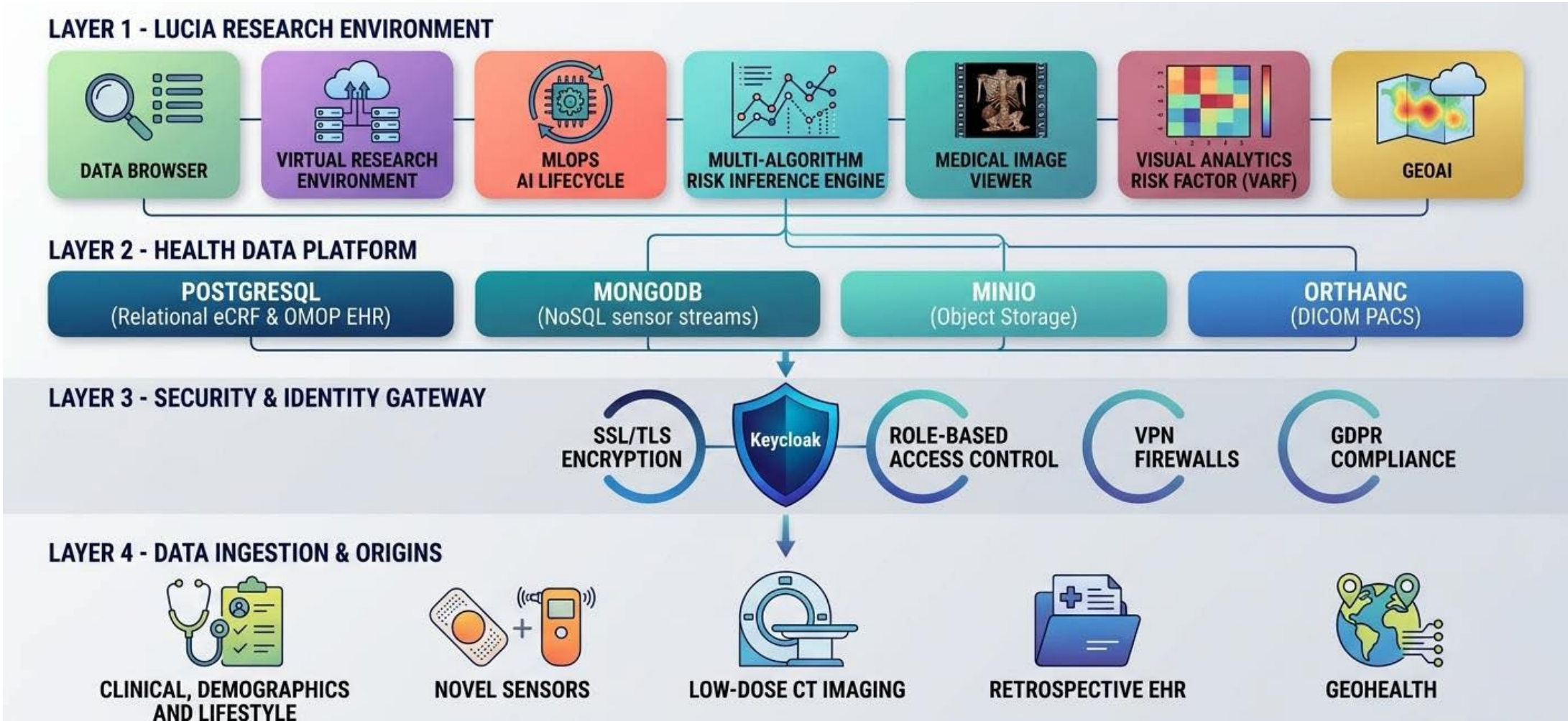
AGE GROUP

40-50 years	51-64 years	65-80 years
28%	43%	29%

SMOKING HABIT

ex-smoker	smoker	never-smoker
45%	28%	27%

LUCIA Health Data Platform





Novel Sensors & AI Analytics Results

Breath Analyzer (BAN)
N = 854

72%

Accuracy

Spectrometry-on-Card (SPOC)
N= 1816

81%

Accuracy (± 0.05)

Wearable Patch (WBSP)
N = 502

73%

Accuracy (± 0.04)

Primary Care Impact

Supports a low-cost primary care screening layer to reduce unnecessary imaging.

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Advanced Predictive AI results

Population-based EHR for LC risk stratification
N = 202.830

0,81

AUROC

Trained and tested in SAS (Spain) and validated externally in OSA (Spain) and CHUL (Belgium) (AUROC 0,74)

Environmental & GeoAI
N= 16.636

0,82

AUROC

Genetic / epigenetic risk prediction
N = 2,025

0,81

AUC

Histological subtyping based on CT
N = 13.897

88%

Accuracy

Primary Care Impact

Combining Electronic Health Records, environmental exposome data, and blood-based biomarkers creates an intelligent, low-cost primary care triage layer that optimizes screening coverage, prevents over-imaging, and significantly reduces unnecessary Low-Dose CT scans and associated healthcare costs.

Primary Care Impact

Non-invasive precision diagnosis of IPNs detected in LDCT screening.

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Key Exploitable Results & Contribution to the EU Cancer Mission

1. Clinical & Policy Transformation

53–67 yrs

Risk-Adapted Starting Ages for Former Heavy Smokers

- Moving from age/smoking-only guidelines toward **risk-adapted screening** (published in *JAMA Network Open*).
- **Social Lab White Papers** & Value-Sensitive Design (VSD) frameworks.
- Ensuring strict **ethical, GDPR, and AI Act compliance**.

2. Open Science & Dissemination

31

Peer-Reviewed Publications

- Published in **top-tier journals** (*eClinicalMedicine*, *JAMA Network Open*, *Molecular Oncology*).
- **FAIR Data Principles**: Fully aligned for global research accessibility.
- **EHDS Portal Interoperability** for seamless cross-border European health data sharing (prospective study metadata is available under EHDS standards).

3. Long-Term Exploitation Assets

TRL6+

Deployment-Ready Assets

- **LUCIA Health Data Platform & VRE**: Production-grade infrastructure.
- **Sensing Hardware**: Mass-manufacturable BAN, WBSP, and SPOC devices.
- **AI-based Lung Cancer Risk Assessment Models**: Models that strengthen precision screening tools.
- **New therapies:** Demonstration of anti-tumor and anti-metastatic effects of a protein inhibitor in preclinical models.

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THANK YOU!

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