



# A longitudinal multi-omics cohort of patients with acute coronary syndrome (LM-ACS Cohort)

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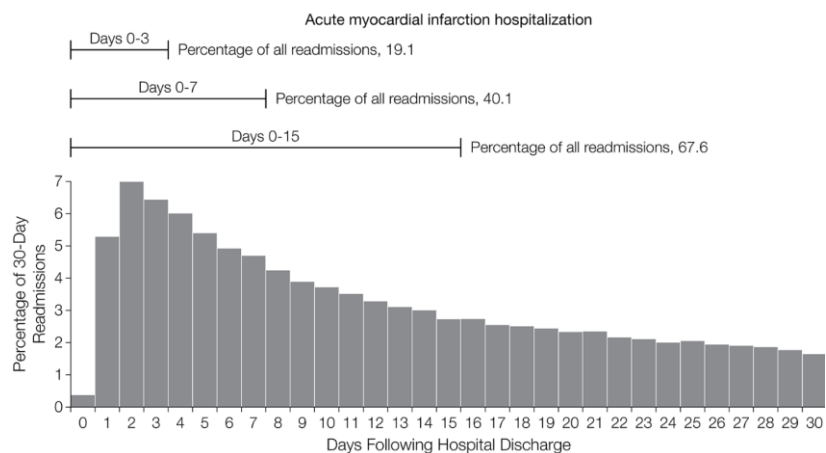
2024. Cohort profile: A longitudinal multi-omics cohort of patients with acute coronary syndrome.

*iMetaOmics* 1: e18. <https://doi.org/10.1002/imo2.18>

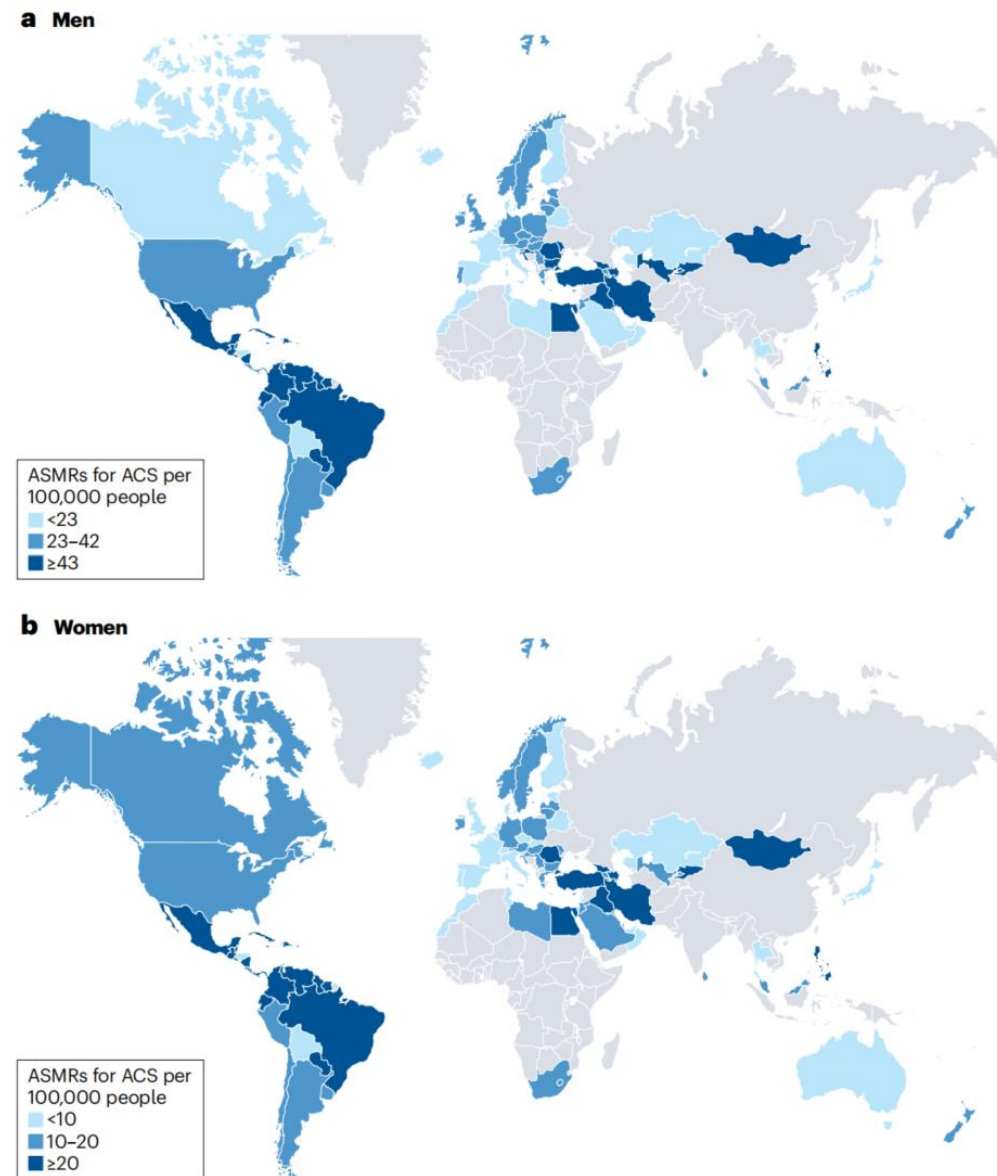


# Background

- Over 7 million new cases of acute coronary syndrome (ACS) occur globally each year, with China expected to reach 23 million cases by 2030.
- Despite treatment advances, ACS patients, especially those with ST-segment elevation myocardial infarction (STEMI), still face high readmission and five-year all-cause mortality rates.
- The repair process after myocardial ischemia is complex, influenced by factors like lifestyle, gut microbiota, and genetic susceptibility.
- There is a lack of systematic longitudinal studies and multi-omics analyses; existing cohorts rely mainly on clinical registries, lacking comprehensive follow-up and sample collection.



Diagnoses and Timing of 30-Day Readmissions After Hospitalization for Heart Failure, Acute Myocardial Infarction, or Pneumonia. *JAMA* 309: 355–63.

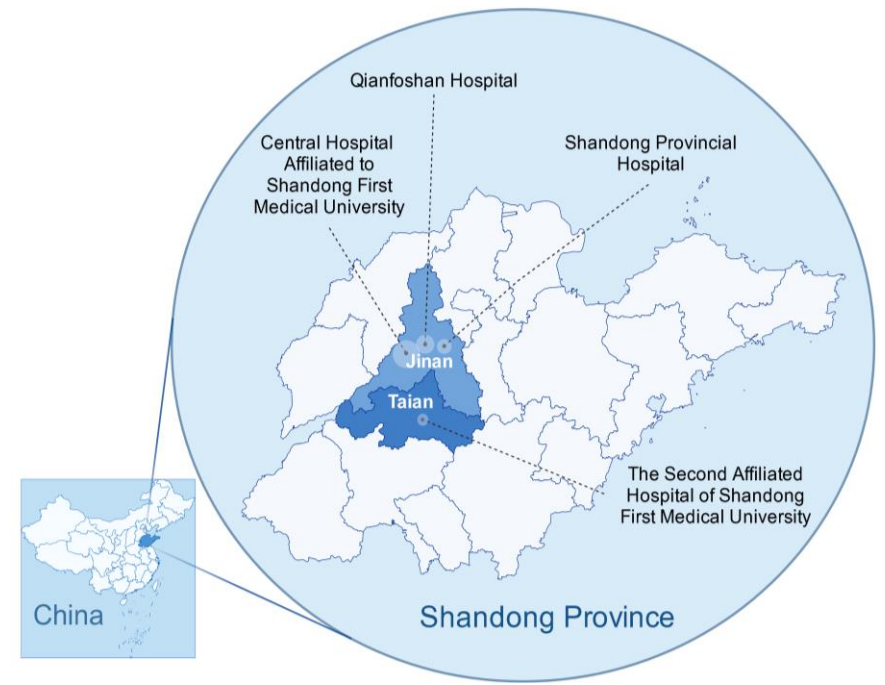
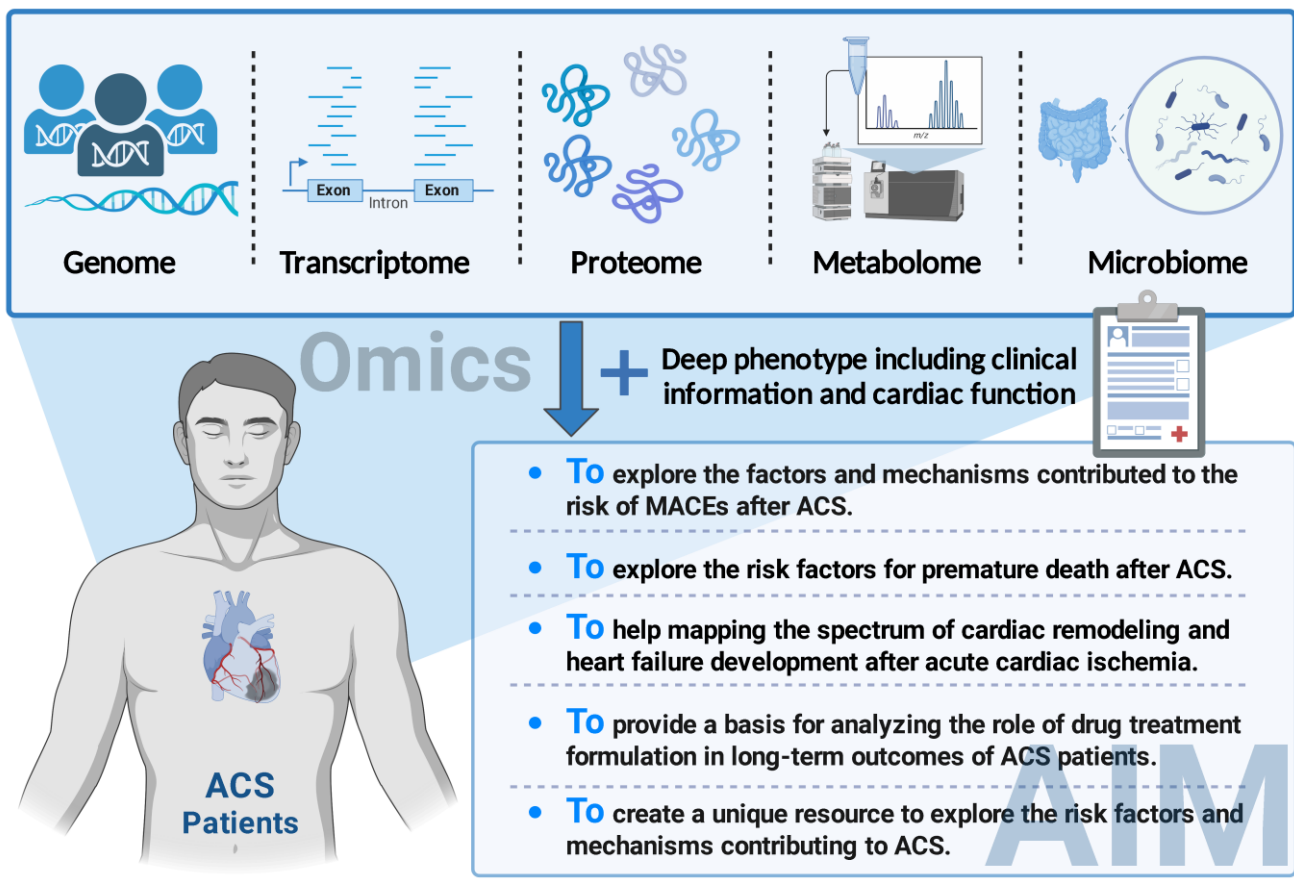


Global epidemiology of acute coronary syndromes. *Nat Rev Cardiol* 20, 778–788 (2023).



# LM-ACS Cohort Overview and Objectives

- The LM-ACS cohort is a large-scale longitudinal clinical study designed to explore the complex biological mechanisms underlying ACS onset and prognosis.
- With an expected enrollment of 50,000 ACS patients, the LM-ACS cohort aims to reveal dynamic changes in ACS-related metabolic pathways using multi-omics techniques combined with big data analysis, providing critical insights for prognosis, timely intervention, and personalized treatment strategies.



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- Shandong Provincial Hospital
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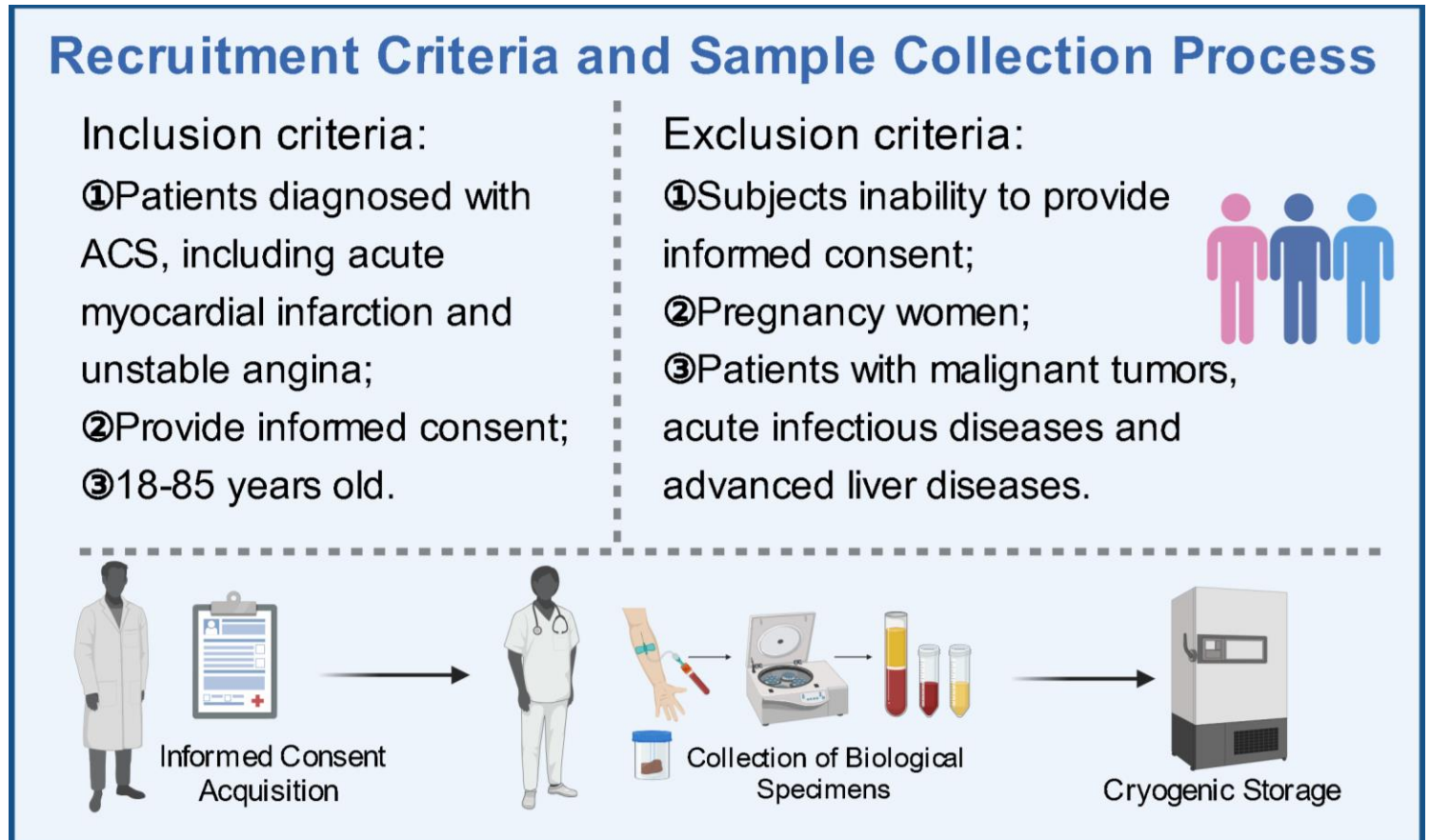
# Recruitment Criteria and Sample Collection Process of the LM-ACS Cohort

## Patient Recruitment:

- ✓ Recruit patients aged 18-85 who meet the diagnostic criteria for acute coronary syndrome (ACS), including acute myocardial infarction (AMI) and unstable angina (UA).
- ✓ Exclude patients with malignant tumors, acute infectious diseases, advanced liver disease, and pregnant women.

## Sample Collection Process:

- Obtain informed consent.
- Collect biological samples using standardized procedures.
- Transport samples to the biobank according to the specified timeline.





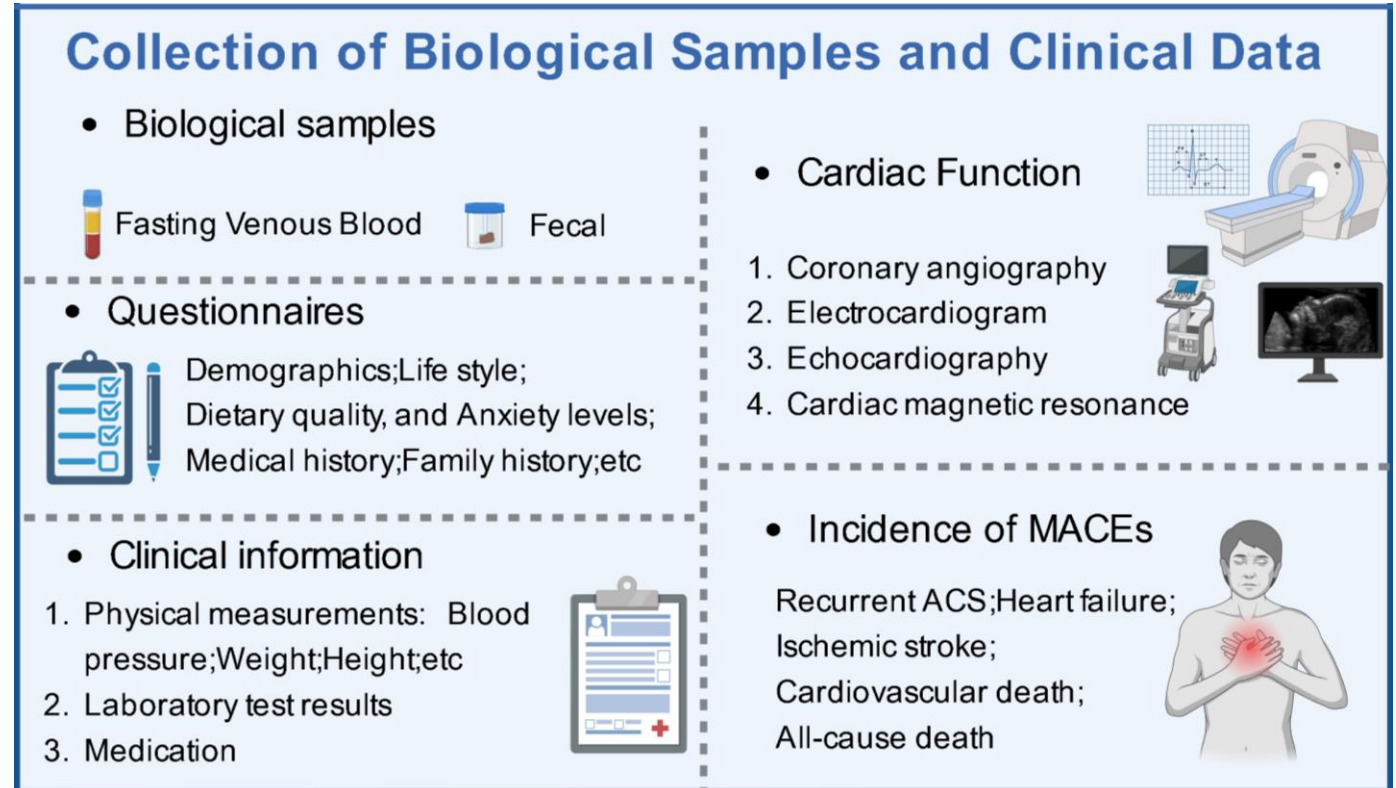
# Collection of Biological Samples and Clinical Data in the LM-ACS Cohort

## Biological Samples:

- Fasting venous blood
- Fecal samples

## Clinical Data:

- Questionnaire: Demographics, lifestyle, diet quality, anxiety levels, medical history, family disease history, etc.
- Clinical Indicators: Body measurements, laboratory test results, medication usage.
- **Cardiac Function Assessment:** Coronary angiography, ECG, echocardiography, cardiac MRI.

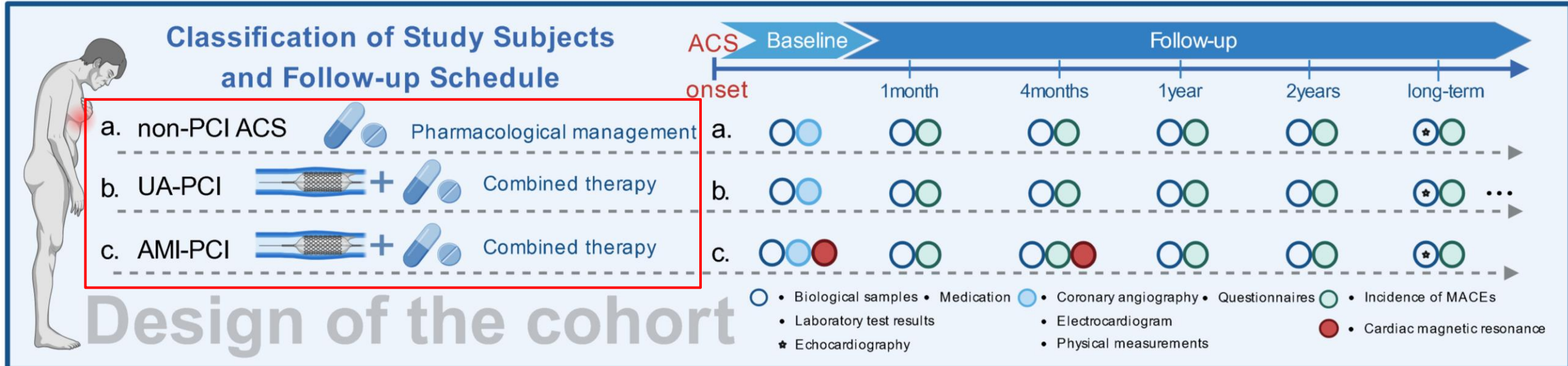




# Follow-up Design of the LM-ACS Cohort

## Follow-up Plan:

- Patients are categorized into three groups based on whether they underwent percutaneous coronary intervention (PCI) during hospitalization.
- For AMI patients who underwent PCI, cardiac MRI data is collected during hospitalization and 4 months post-surgery.
- Long-term follow-up at 1 month, 4 months, 1 year, and 2 years post-surgery, collecting biological samples and clinical data at multiple time points.
- **The follow-up primarily tracks the incidence of MACEs.**

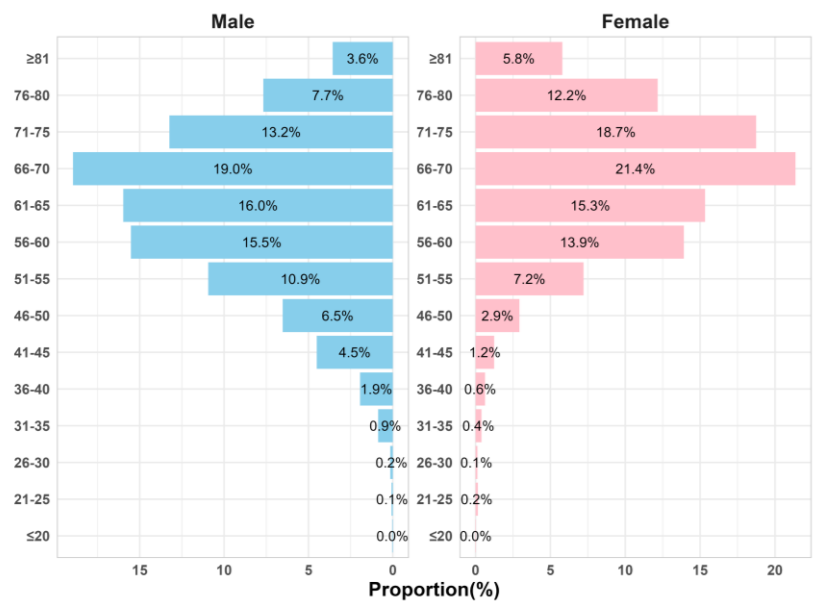


# Progress in Patient Recruitment for the LM-ACS Cohort

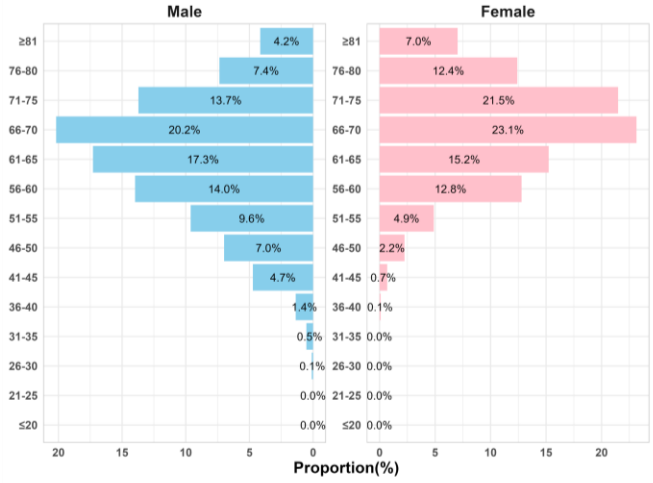
As of October 2023, a total of 8,615 patients have been recruited, including 5,301 males and 3,314 females.

- Central Hospital Affiliated to Shandong First Medical University: 2,927 patients.
- Shandong Provincial Hospital: 2,262 patients.
- Shandong Provincial Qianfoshan Hospital: 2,599 patients.
- The Second Affiliated Hospital of Shandong First Medical University: 827 patients.

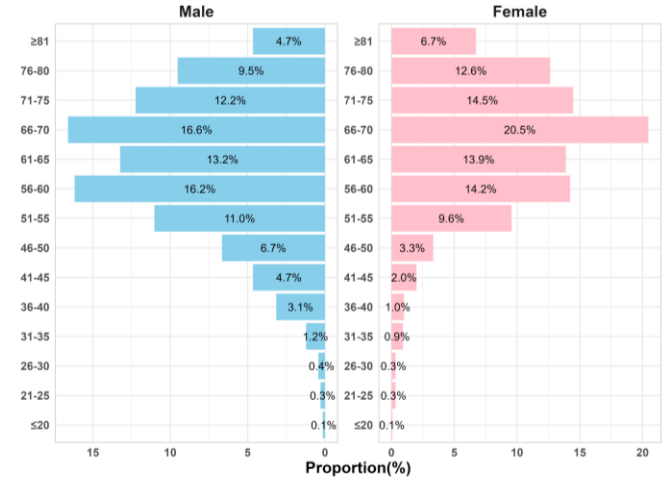
Overall age and gender distribution of recruited patients as of October 2023



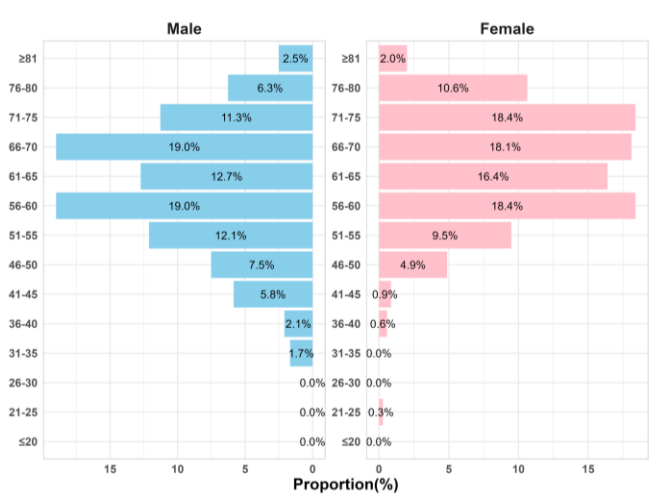
Age and gender distribution of patients enrolled at Central Hospital Affiliated to Shandong First Medical University



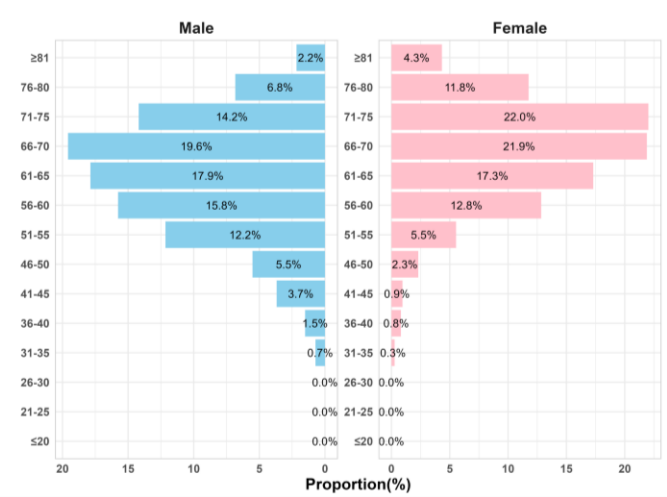
Age and gender distribution of patients enrolled at Qianfoshan Hospital



Age and gender distribution of patients enrolled at The Second Affiliated Hospital of Shandong First Medical University



Age and gender distribution of patients enrolled at Shandong Provincial Hospital





# Conclusion

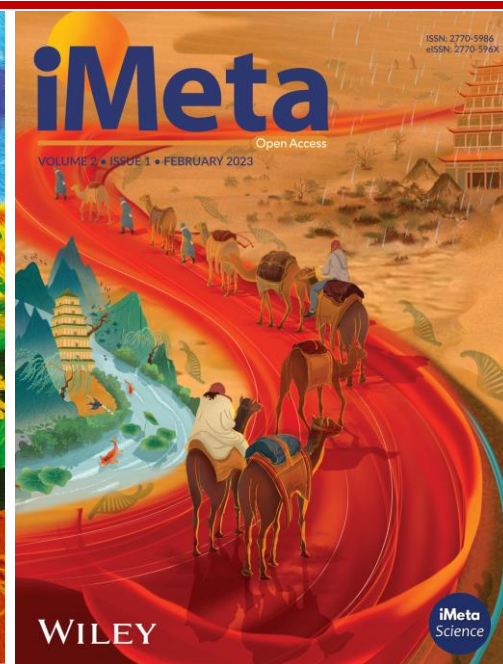
- The LM-ACS cohort is a real-world prospective study designed to explore the risk factors and mechanisms of acute coronary syndrome (ACS) onset and prognosis. Detailed clinical information is collected through electronic medical records during hospitalization, with biological samples and in-depth phenotypic data gathered at multiple time points.
- Post-discharge follow-ups are conducted at 1, 4, 6, 12, and 24 months to continuously monitor patients' health and treatment outcomes.
- As of October 2023, 8,615 patients aged 18-85 have been recruited from four hospitals in Shandong Province, with a goal to recruit 50,000 ACS patients by the end of 2026.
- The LM-ACS cohort has generated a multi-omics dataset, including genomics, metabolomics, proteomics, and gut microbiomics, which, when integrated with detailed clinical data, provides new insights into the mechanisms of ACS onset, recurrence, and post-ischemia cardiac structural and functional changes.

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