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Sex Differences in Biomarker Levels Following Acute Coronary Syndrome (ACS)

Winterseminar Bled, 13.02.2025
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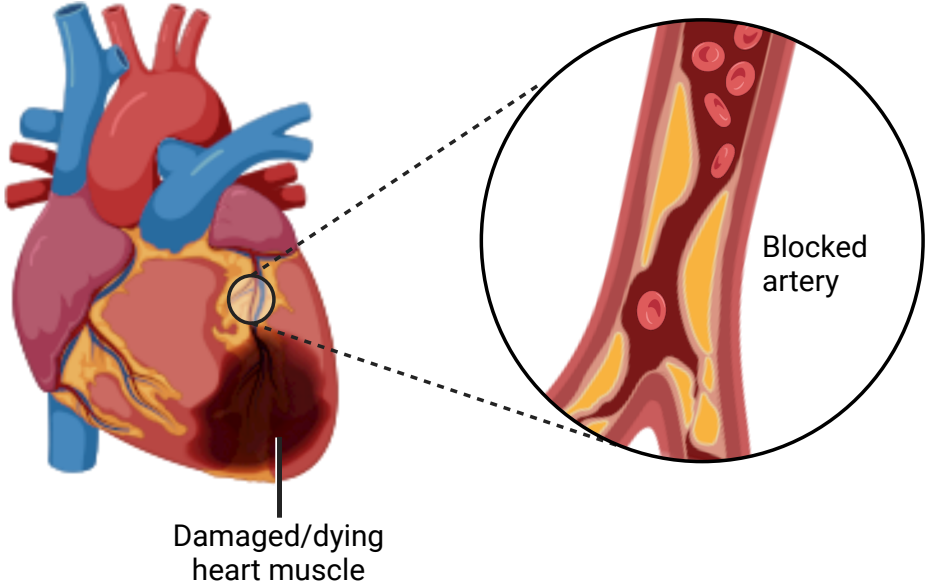
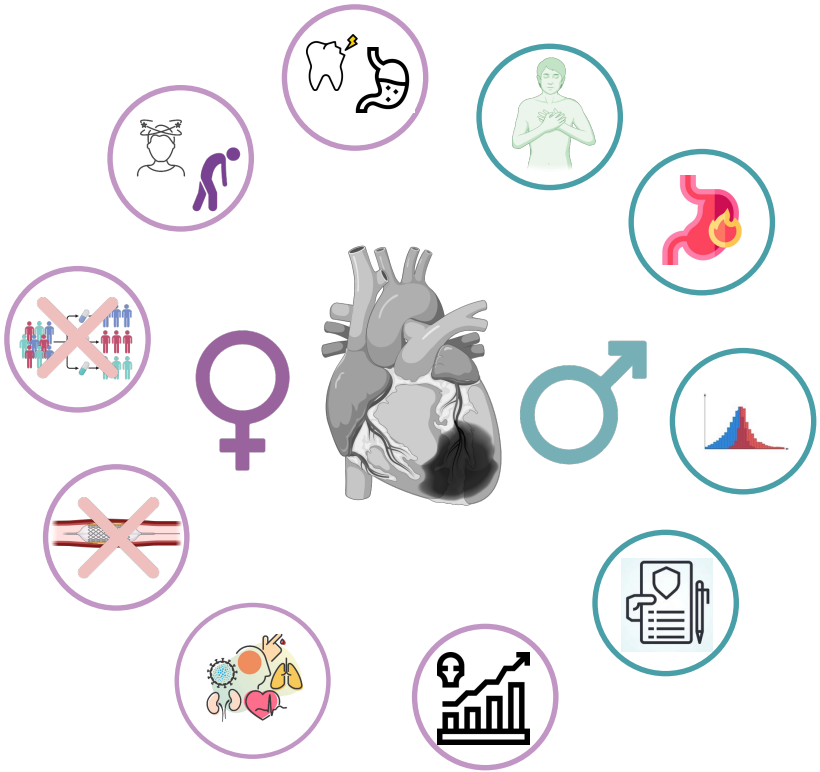
Erasmus MC
Cardiovascular Institute

IZBI

ACUTE CORONARY SYNDROME (ACS) - PATHOLOGY



ACUTE CORONARY SYNDROME - SEX DIFFERENCES



PHASES AFTER ACS

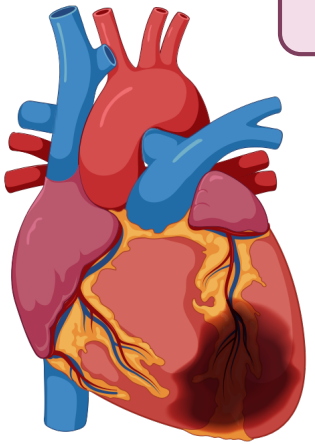
- **Acute phase (0-7 days)**: inflammation, necrosis
- **Subacute phase (1-4 wks)**: proliferative phase (resolution of inflammation, myofibroblast proliferation)
- **Chronic phase (> 4 wks)**: remodelling (replacement of myocardial tissue with fibrous tissue)
- *Possible complications*: heart failure, pericarditis (autoimmune), recurrent ischemia, arrhythmias

ACUTE CORONARY SYNDROME - BIOMARKERS

Myocardial injury
- cTnT
- cTnI

Fibrosis
- Galectin-3
- GDF-15
- ST-2

Inflammation
- CRP
- MPO
- Galectin-3



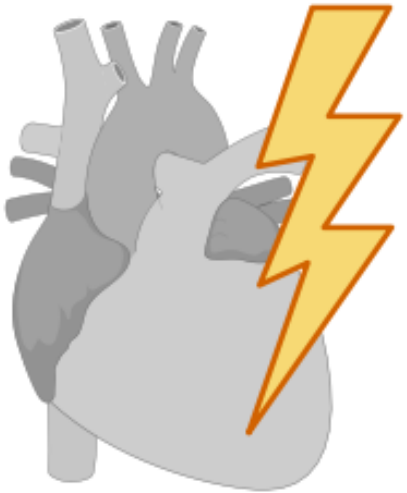
Risk profile
- HDL
- LDL
- Cholesterol
- vWF
- Cystatin C

Heart failure
- NT-pro-BNP

AIM: Can we identify sex-specific levels and trajectories of these cardiac biomarkers after an ACS?

DATASET - BIOMARCS COHORT

= BIOMarker study to identify the **A**cute **r**isk of a **C**oronary **S**yndrome



INCLUSION CRITERIA:

- Patients with ACS
- > 40yrs
- + at least 1 risk factor

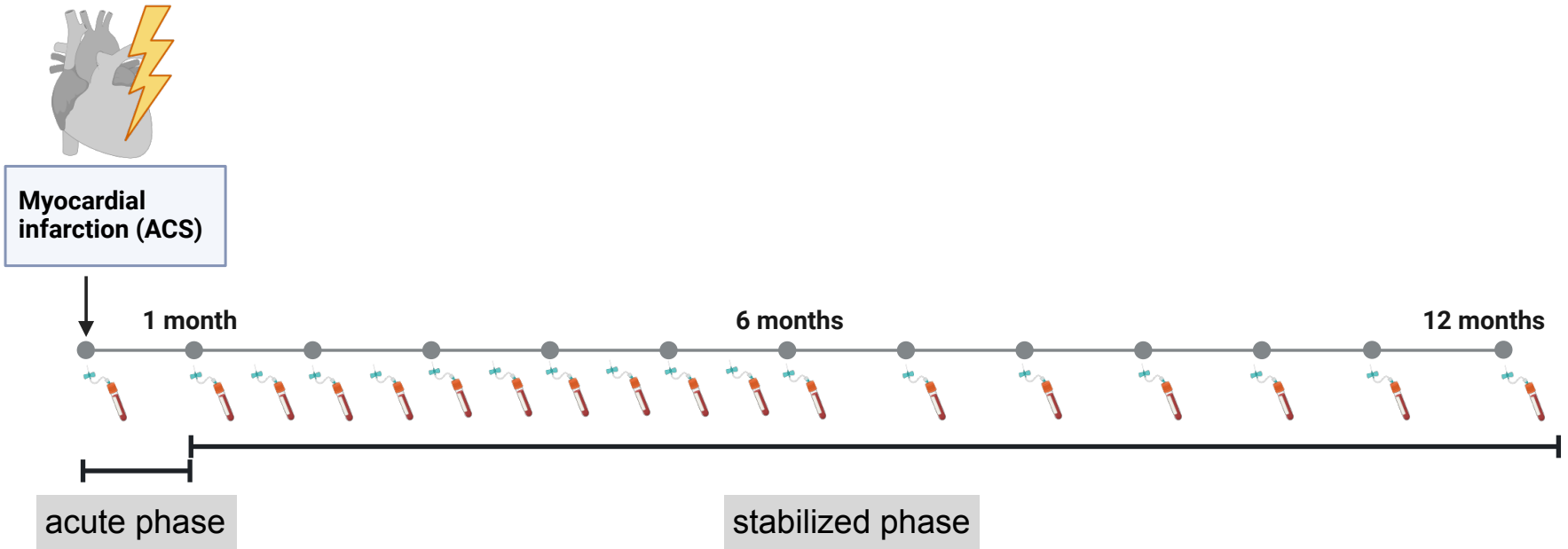
PRIMARY ENDPOINTS:

- Death due to cardiac condition
- Re-infarction

➡ 844 patients included

DATASET - BIOMARCS COHORT

Blood sampling protocol:



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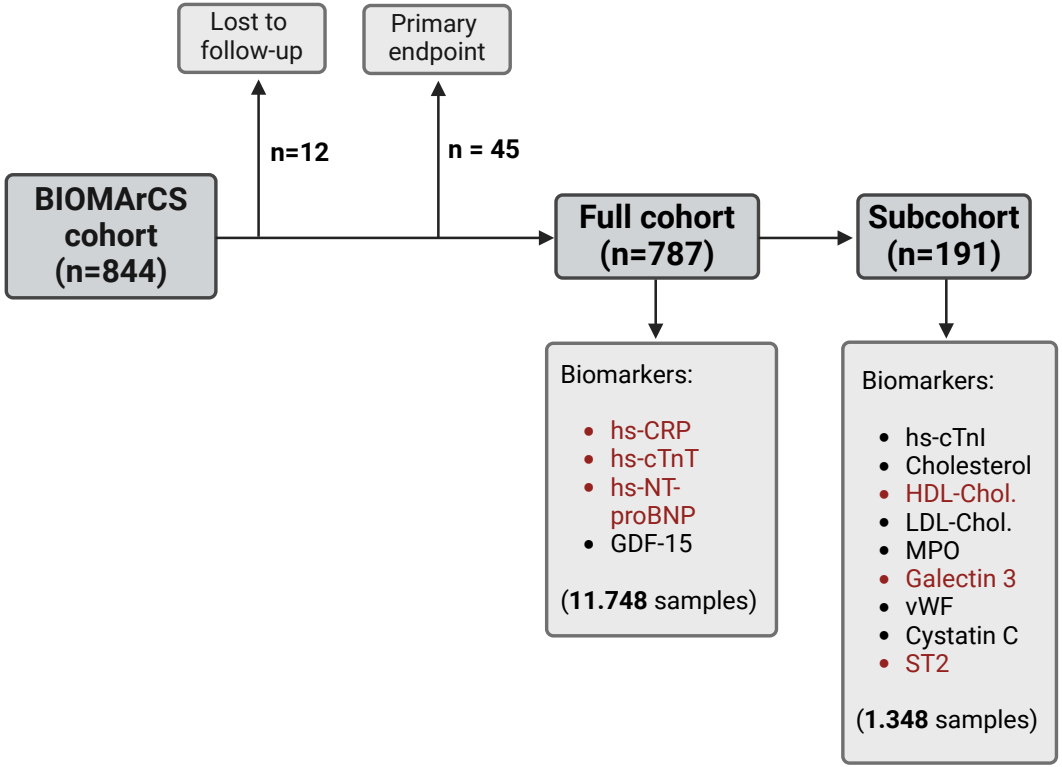

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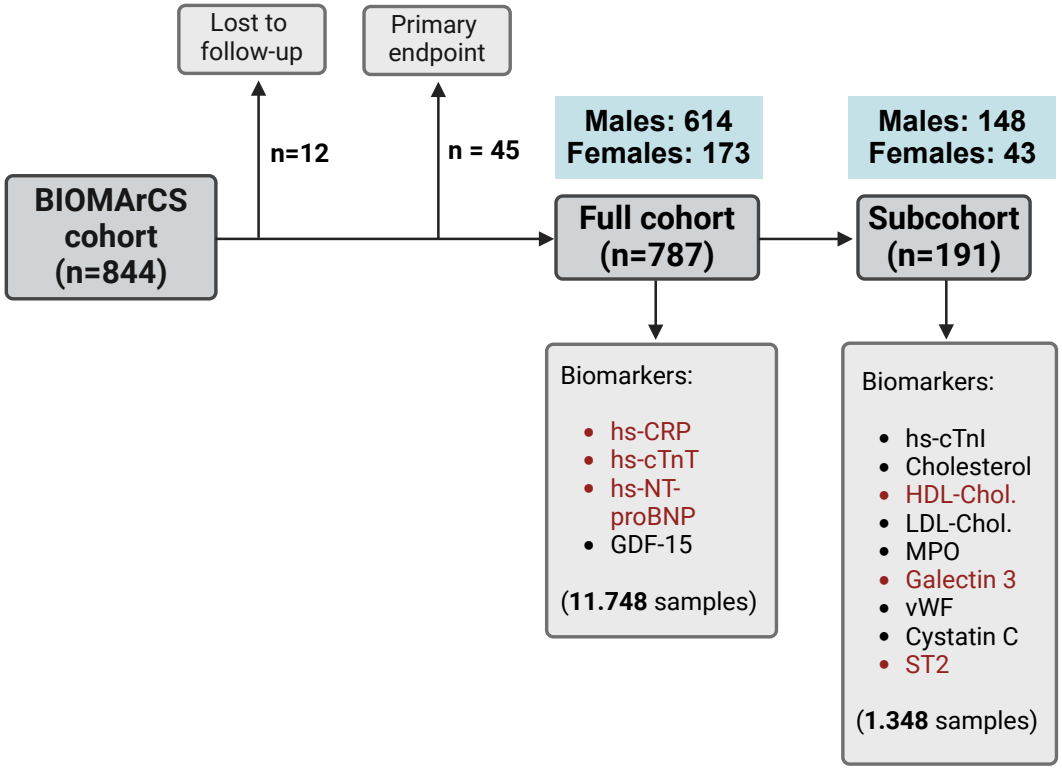
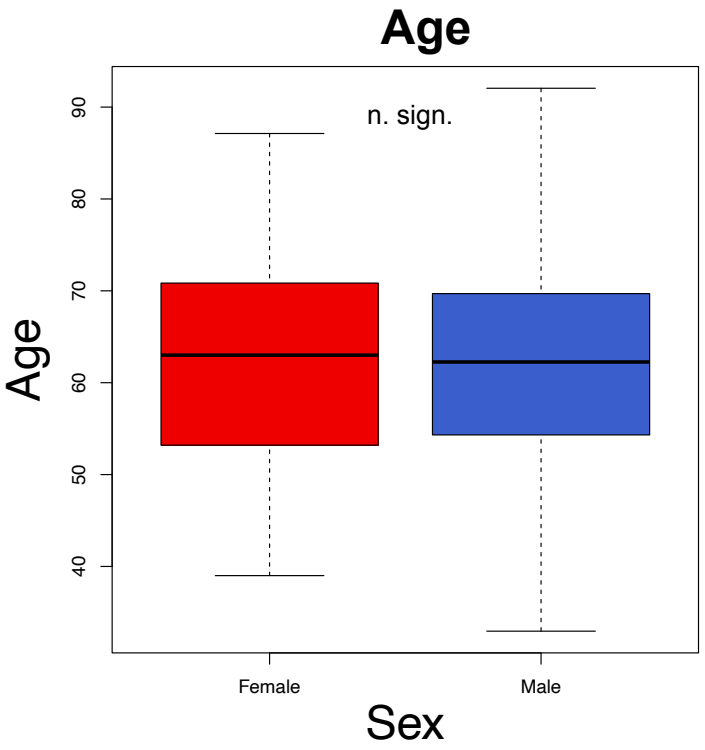
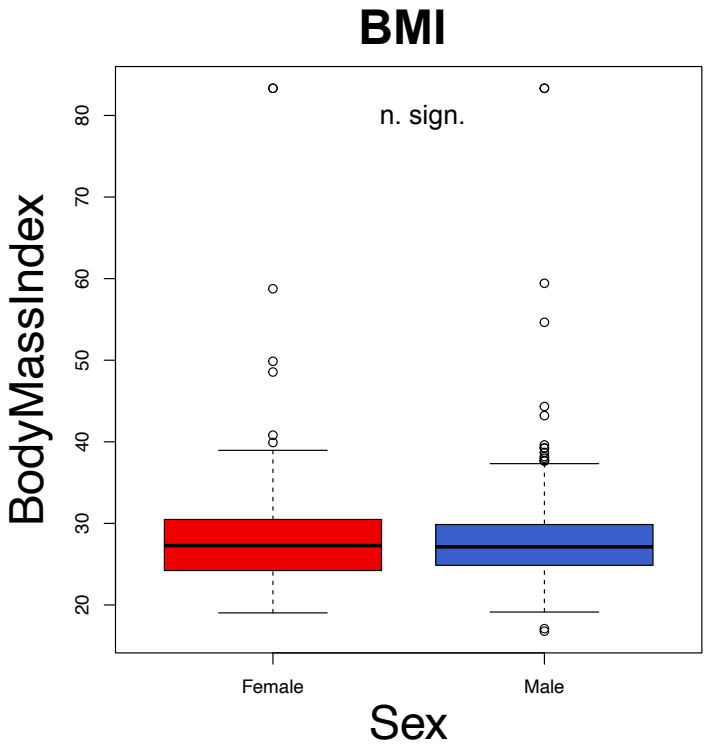


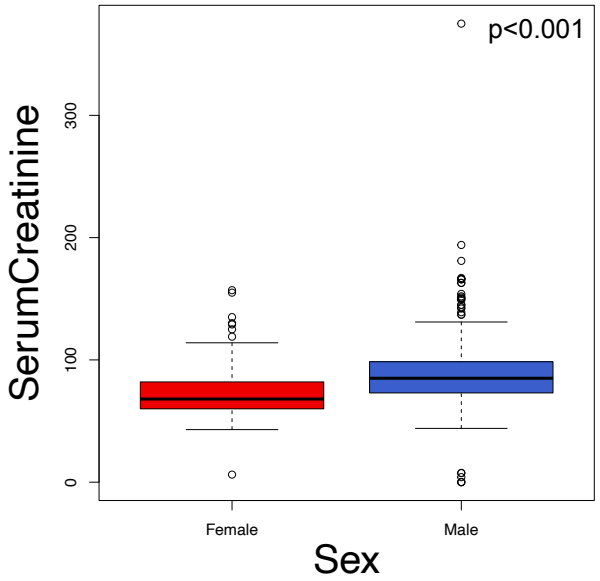
COHORT - BASELINE



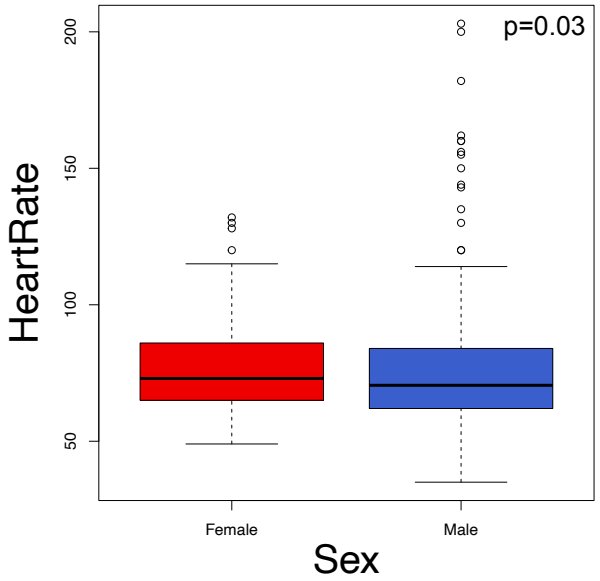


COHORT - BASELINE

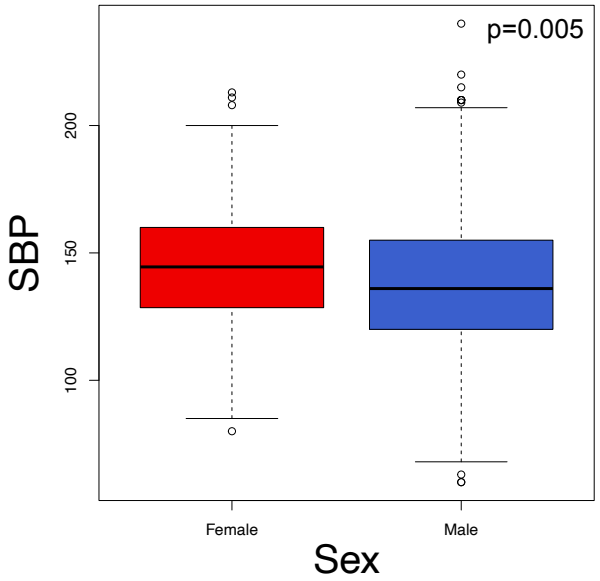
Creatinine



Heart Rate

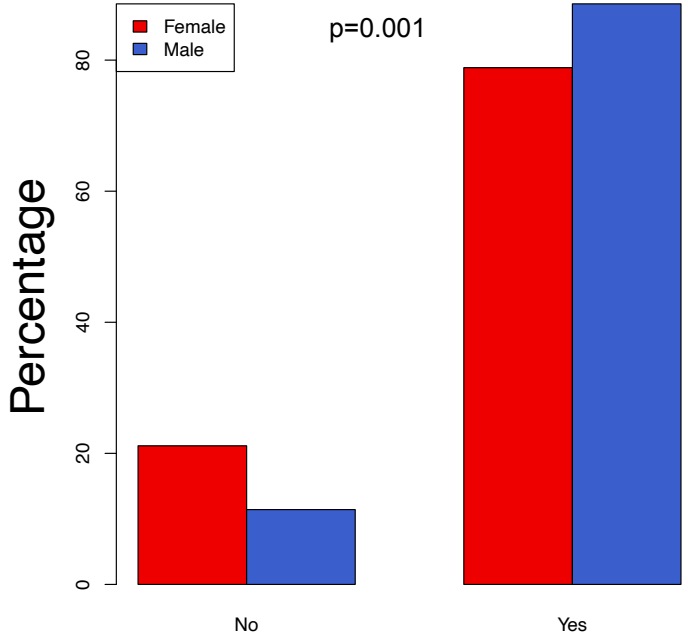


Systolic blood pressure

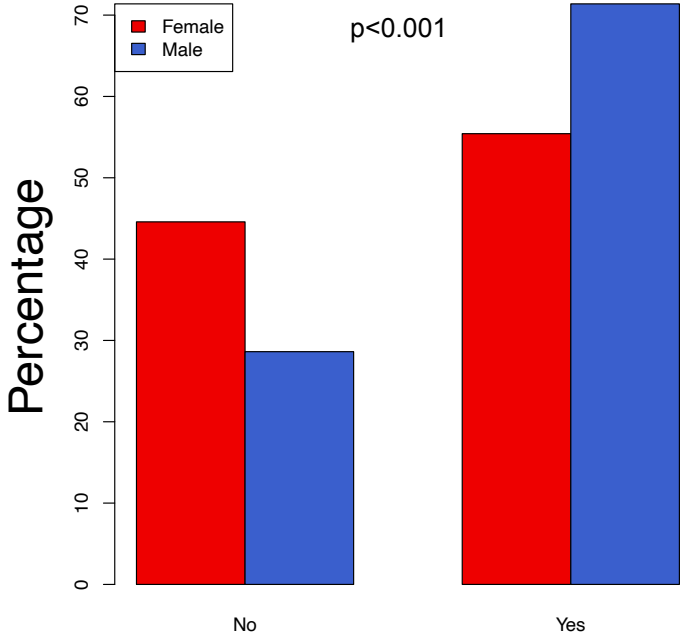


COHORT - BASELINE

PCI performed

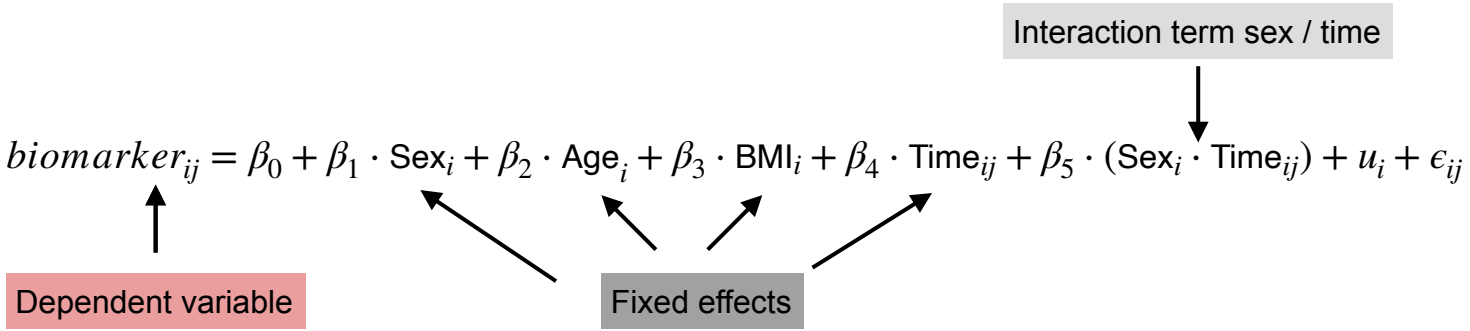


ACEi discharge medication



METHODS - LINEAR MIXED-EFFECTS MODELS (LMM)

- Extension of linear regression to account for longitudinal measurements
- Fixed effects = explanatory variables, assumed to be constant across all groups or individuals



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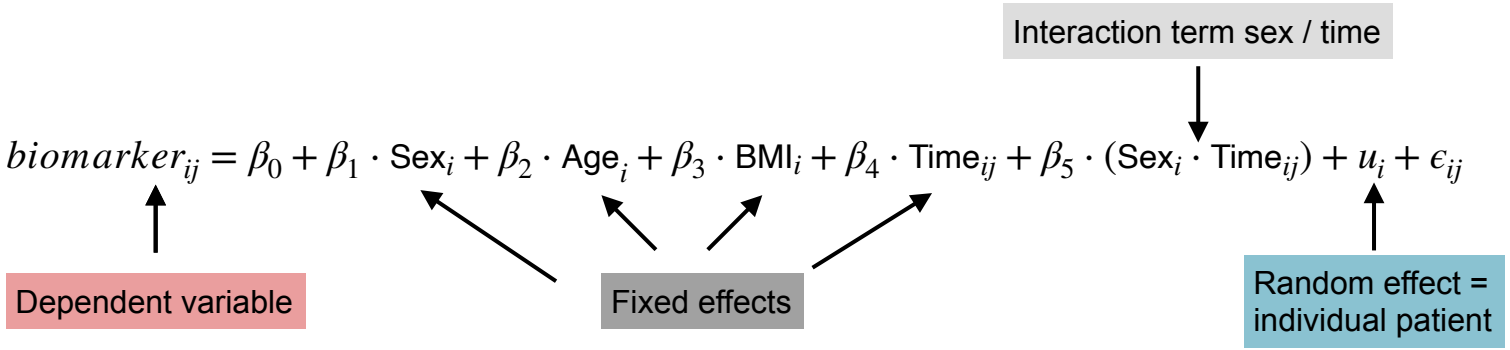

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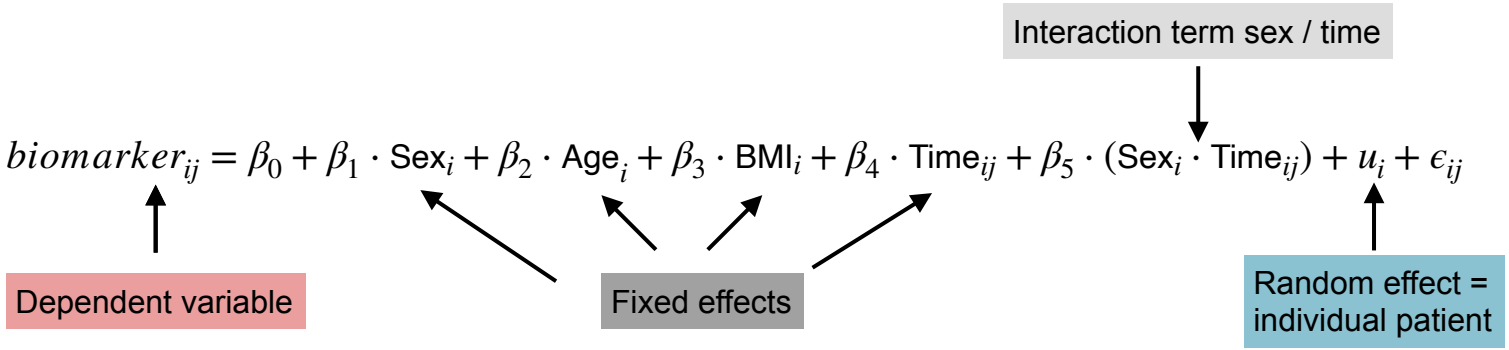
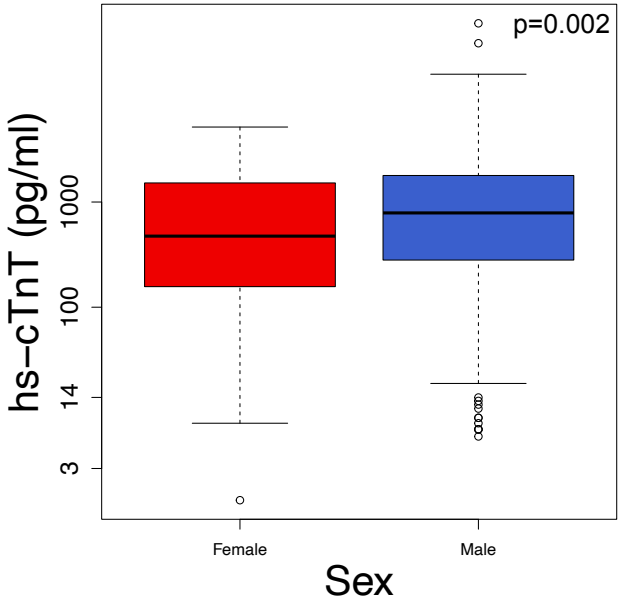


➡ Modeling for each biomarker for acute and stabilized phase

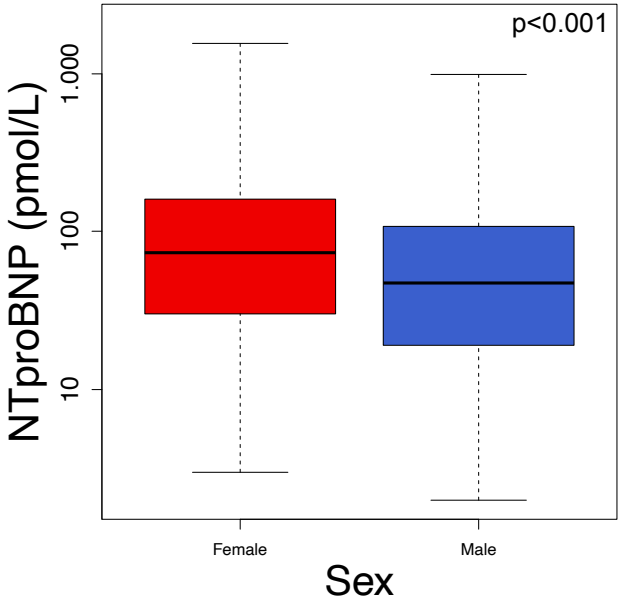
RESULTS - ACUTE PHASE - FULL COHORT

Troponin T



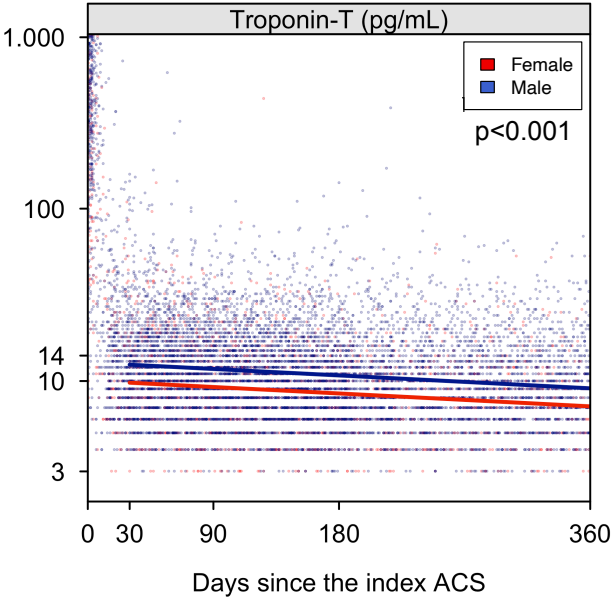
cardiac damage

NT-proBNP



heart failure

RESULTS - STABILIZED PHASE - FULL COHORT



cardiac damage

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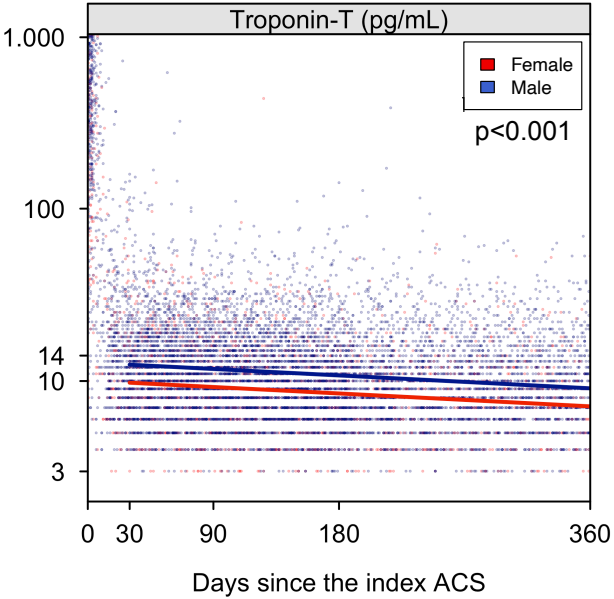

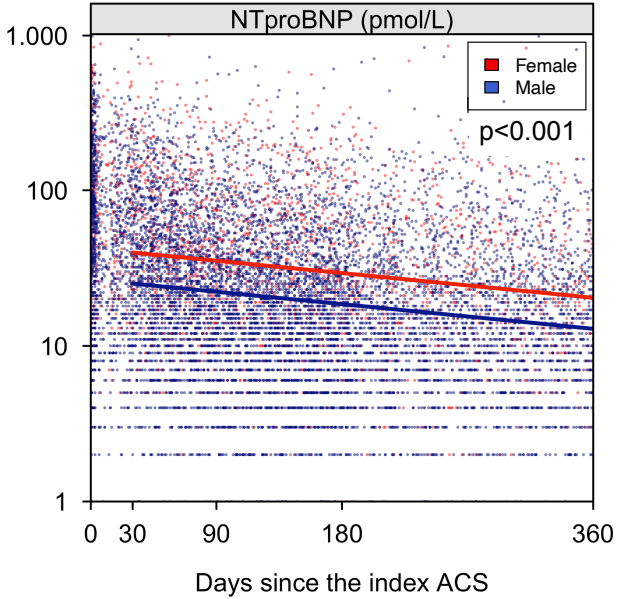

cardiac damage

heart failure

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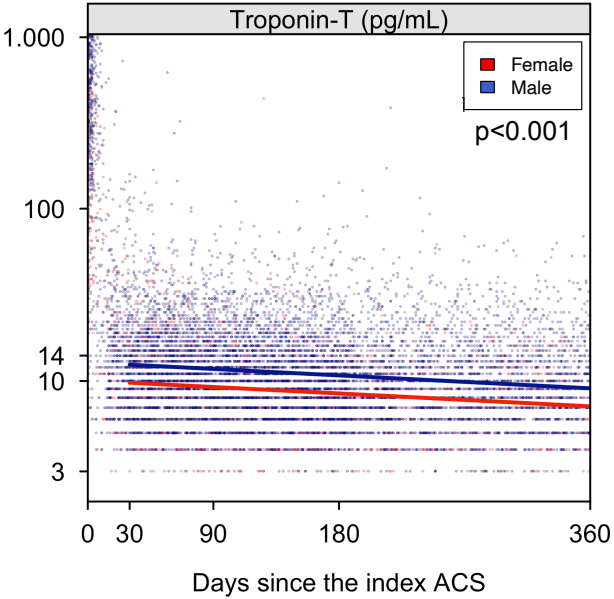
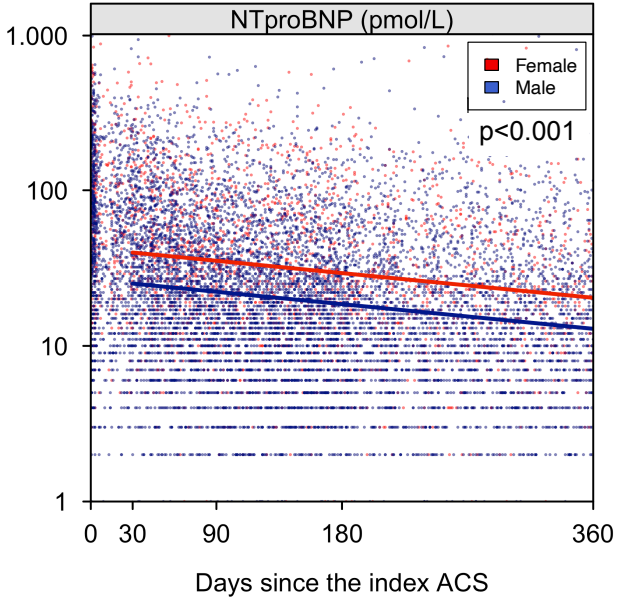
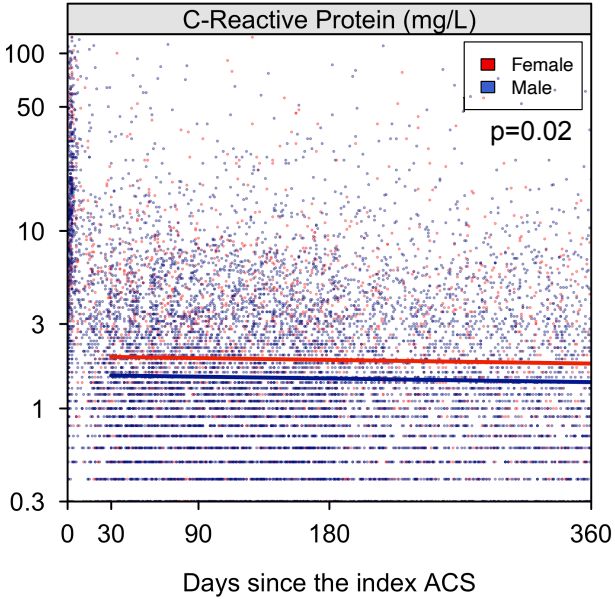






cardiac damage

heart failure

inflammation

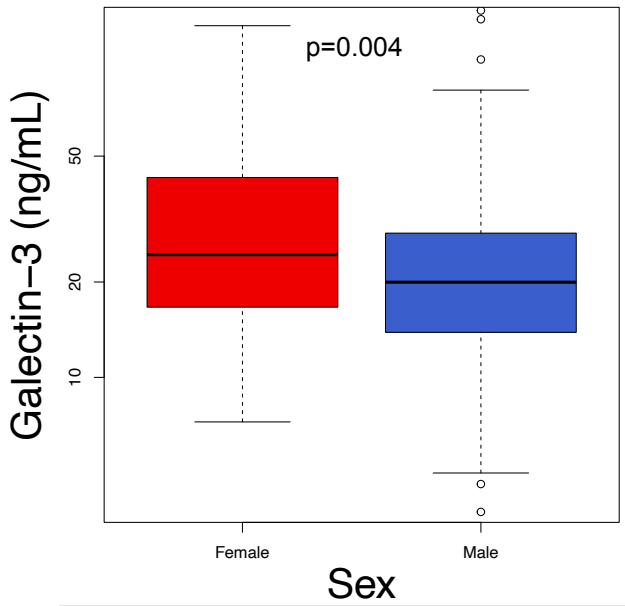
FULL COHORT - OTHER TRENDS

- **Age**:
  - positive correlation with **NT-proBNP**, **TnT**, **GDF-15** (acute and stabilized phases)

- **BMI**:
  - positive correlation with **TnT**, **GDF-15**, **CRP** (stabilized phase)

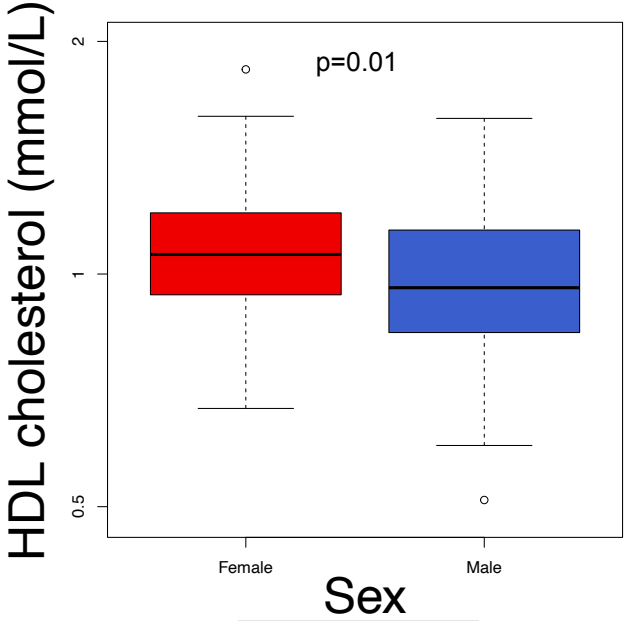
RESULTS - ACUTE PHASE - SUBCOHORT

Galectin-3



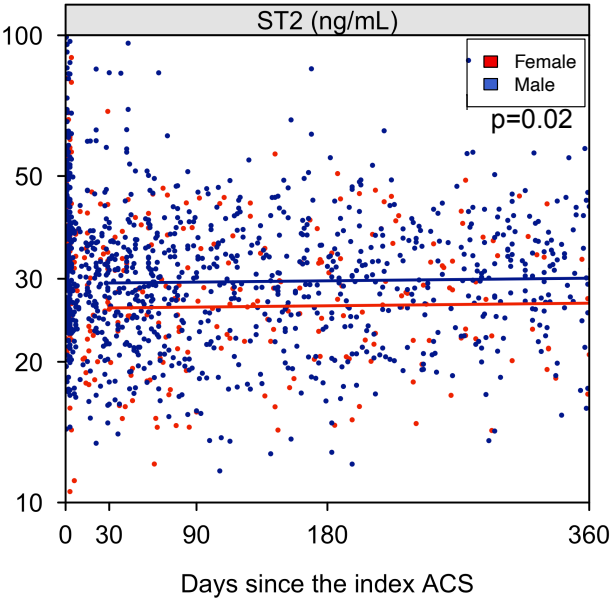
fibrosis risk & inflammation

HDL Cholesterol



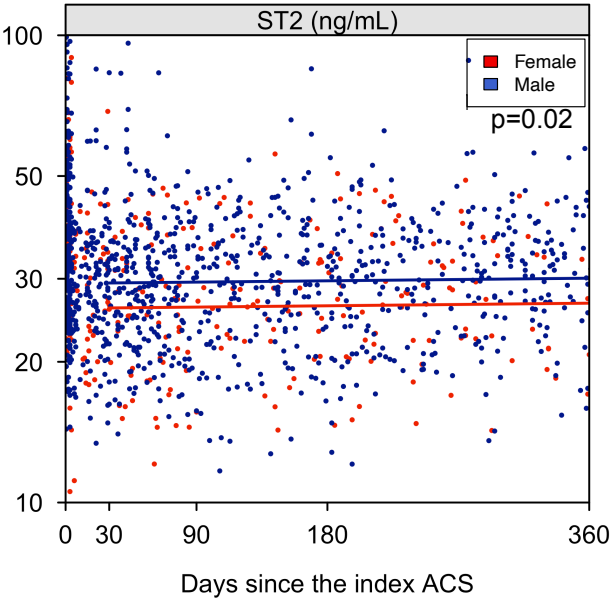
risk profile

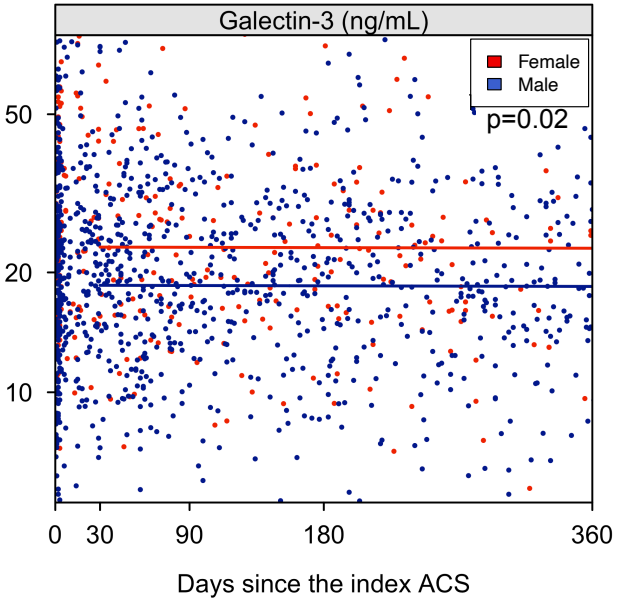
RESULTS - STABILIZED PHASE - SUB COHORT



fibrosis risk & inflammation

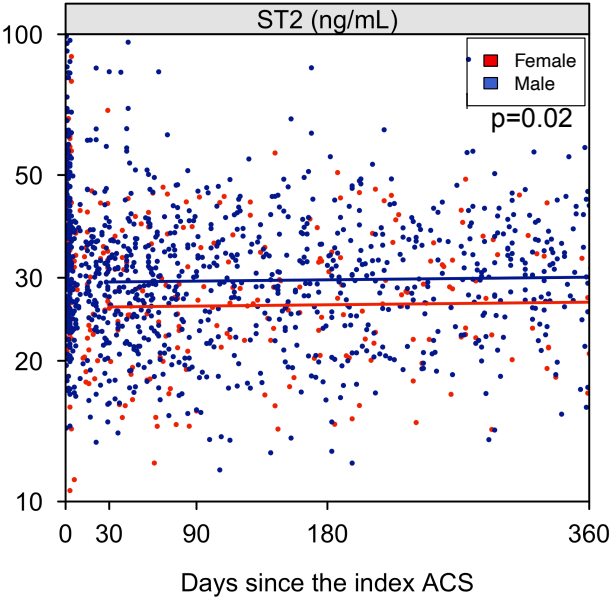
RESULTS - STABILIZED PHASE - SUB COHORT

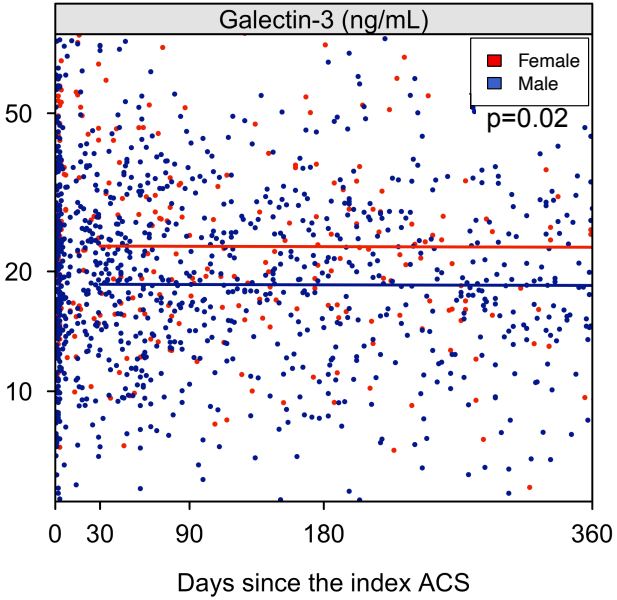


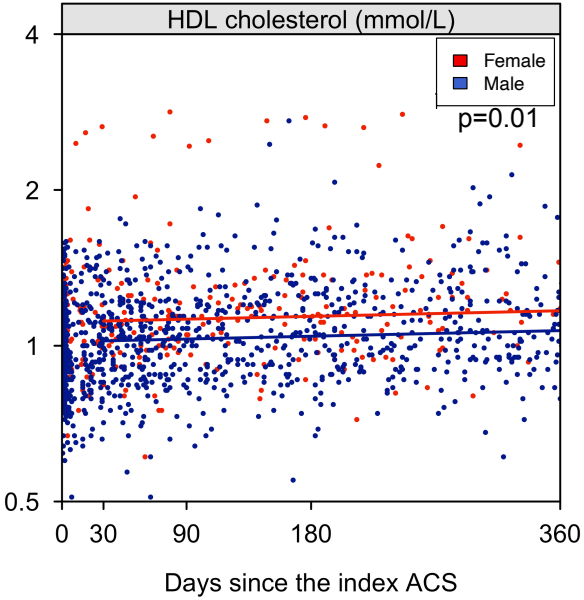


fibrosis risk & inflammation

RESULTS - STABILIZED PHASE - SUB COHORT







fibrosis risk & inflammation

risk profile

SUBCOHORT - OTHER TRENDS

- **BMI**: pos. correlated with **Gal-3**
- **Age**: pos. correlated with **TnI**, **ST2**, **HDL**
- **Kidney function** (eGFR): pos. correlated with **LDL**, **HDL**, **Cholesterol**

SUMMARY & OUTLOOK

- Biomarker trajectories after ACS differ only slightly by sex
- Sex differences in biomarker levels reflecting
  - cardiac damage (troponin),
  - heart failure risk (NT-proBNP),
  - fibrosis (ST-2, Gal-3),
  - inflammation (CRP, Gal-3)

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- Biomarker trajectories after ACS differ only slightly by sex
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  - cardiac damage (troponin),
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  - fibrosis (ST-2, Gal-3),
  - inflammation (CRP, Gal-3)

➡ sex differences in repair and development of complications after myocardial infarction

➡ sex-specific therapy and follow-up regimens in order to prevent complications and improve outcomes

ACKNOWLEDGMENTS

Epidemiology & Cardiology Group
Erasmus MC

- Jeanine Roeters van Lennep
- Eric Boersma
- Marte van der Bijl

Bioinformatics Group, Leipzig

- Peter F. Stadler
- Stephan H. Bernhart





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THANK YOU!

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