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Clinic Favoriten

Entering the Era of Digital Transformation –
Future Perspectives of Cardiology

No conflict of interest to declare

Overview

- Case Report
- Cardiology Today
- The Era of Digital Transformation and Future Perspectives
- Limitations and Outlook

Case Report

Case Report G.W., 1946

Initial Clinical Presentation in the ER

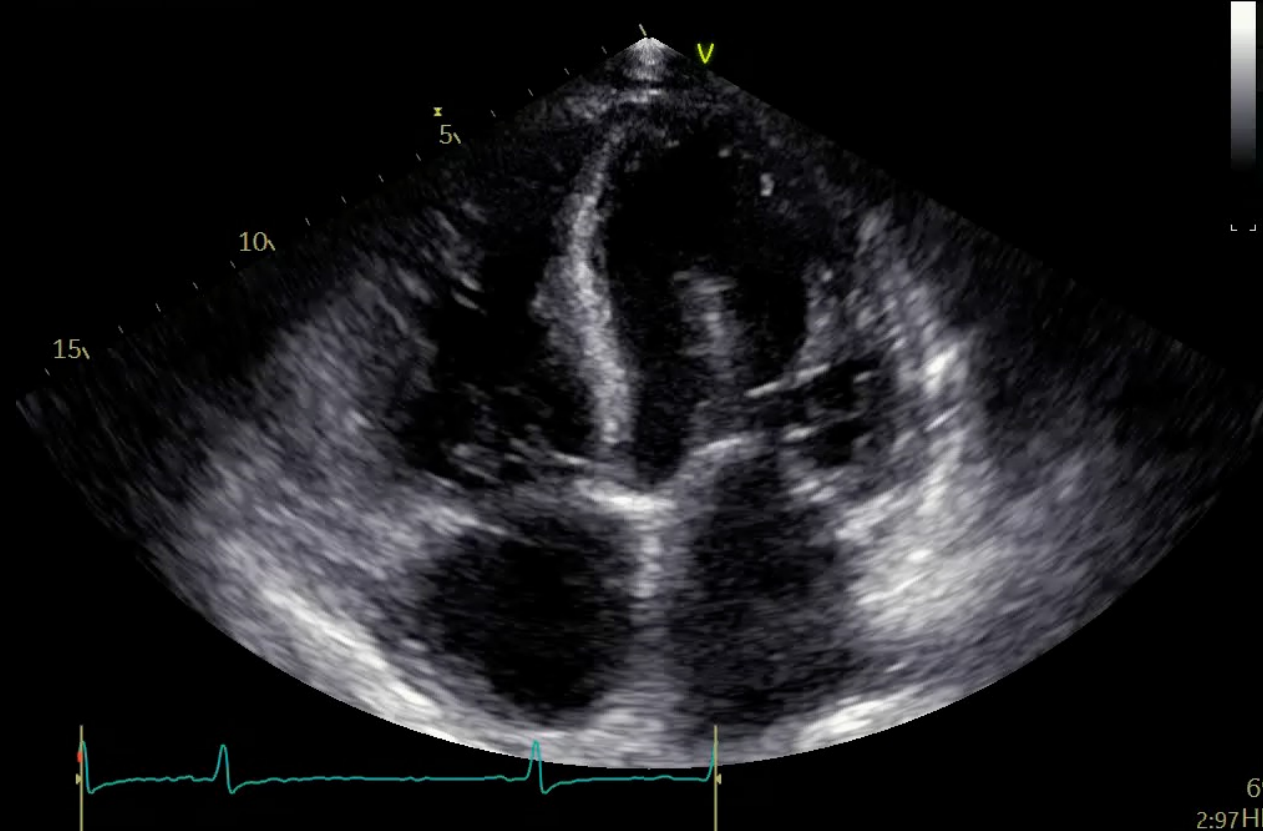Leading symptoms: leg edema, dyspnea, anemia

- Diagnostic work-up:
    - Chest X-ray: Pulmonary Edema
    - NTproBNP >70.000ng/L
    - Echocardiography: LVEF 26% with regional wall-motion abnormalities

Case Report G.W., 1946

Initial Echocardiography 10/2021

Case Report G.W., 1946

Initial Clinical Presentation in the ER

→ 4th hospitalization in 2021 due to acute heart failure

Case Report G.W., 1946

Initial therapeutic approach

- iv. diuretic treatment

- Start with HFrEF therapy to ARNI + SGLT2i + loop diuretic + MRA (+beta-blocker)

- Re-vascularization attempt

  - heart team board: advised against surgical approach due to comorbidities

  - re-attempt PCI

Case Report G.W., 1946 - PTCA 11/2021

1x Orsiro DES Implantation in proximal LAD Stenosis
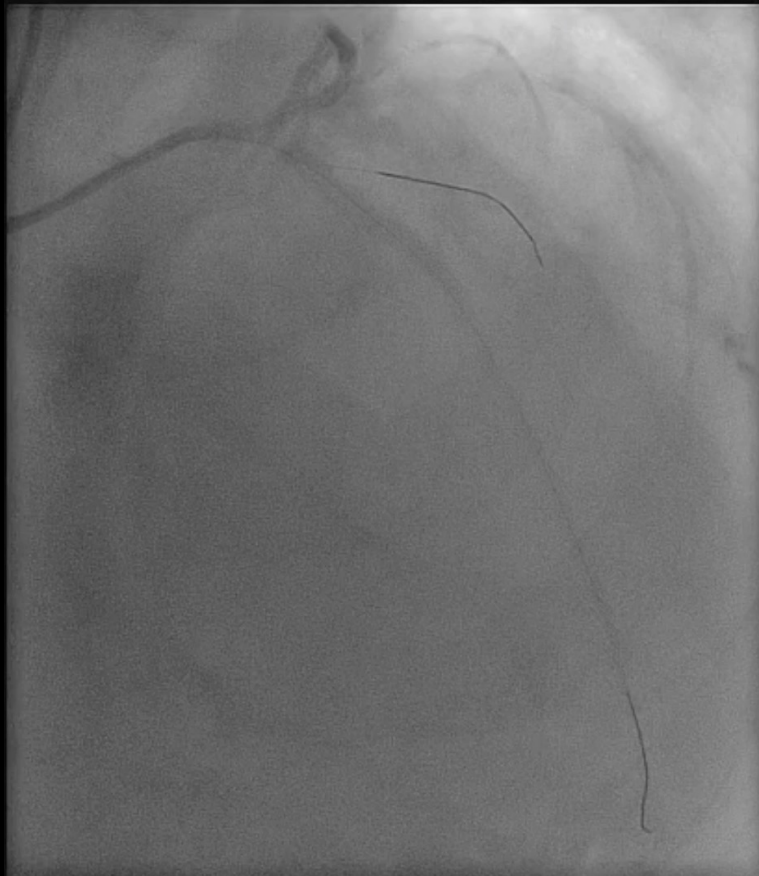
Case Report G.W., 1946
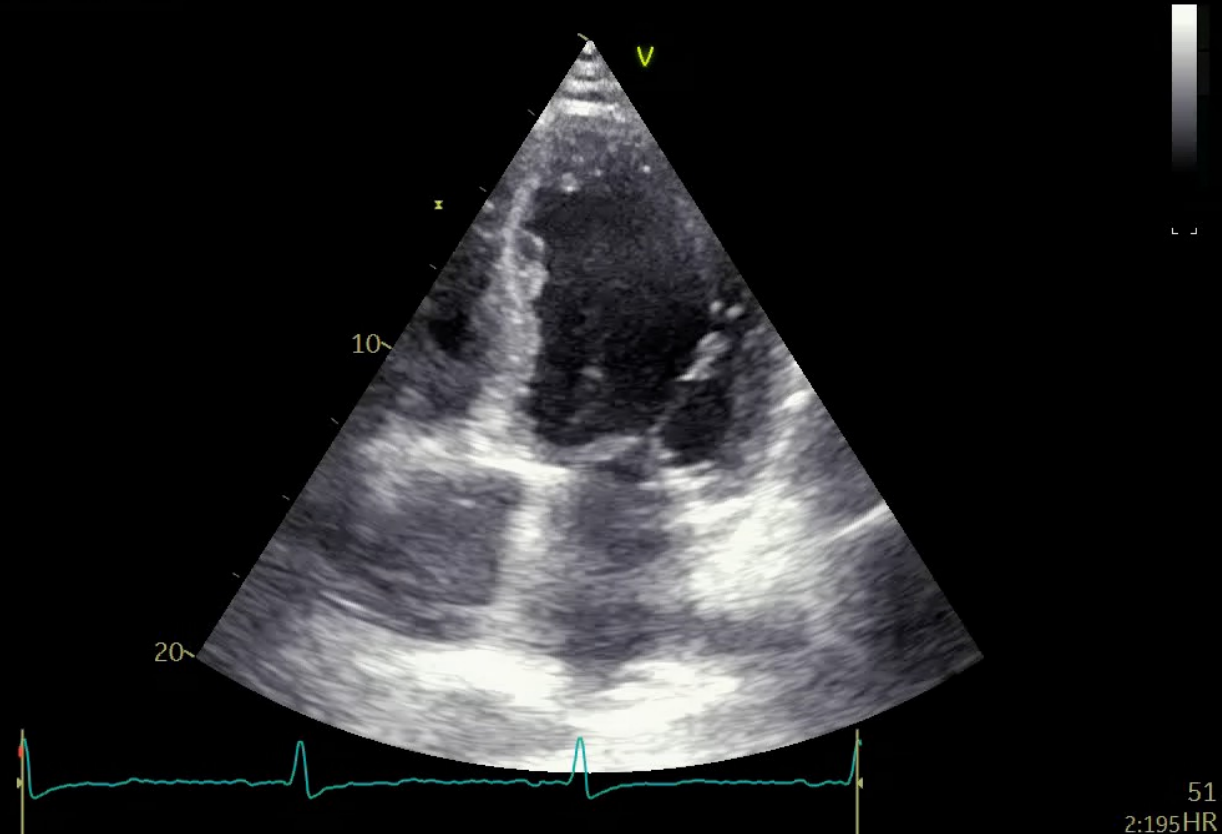
Patient Discharge Nov 2021

- Patient felt subjectively better
    - no leg edema, no dyspnea

- Discharged with HFrEF medication and LifeVest Application

Case Report G.W., 1946

Follow-Up Consultation

Cardiology Today

Introduction

Cardiovascular Disease leading cause of death worldwide

Hospitalization Reasons:

- acute heart failure
- acute coronary syndrome
- cardiac dysrhythmias

Current Methods - Monitoring

electrocardiogram

blood pressure

echocardiography

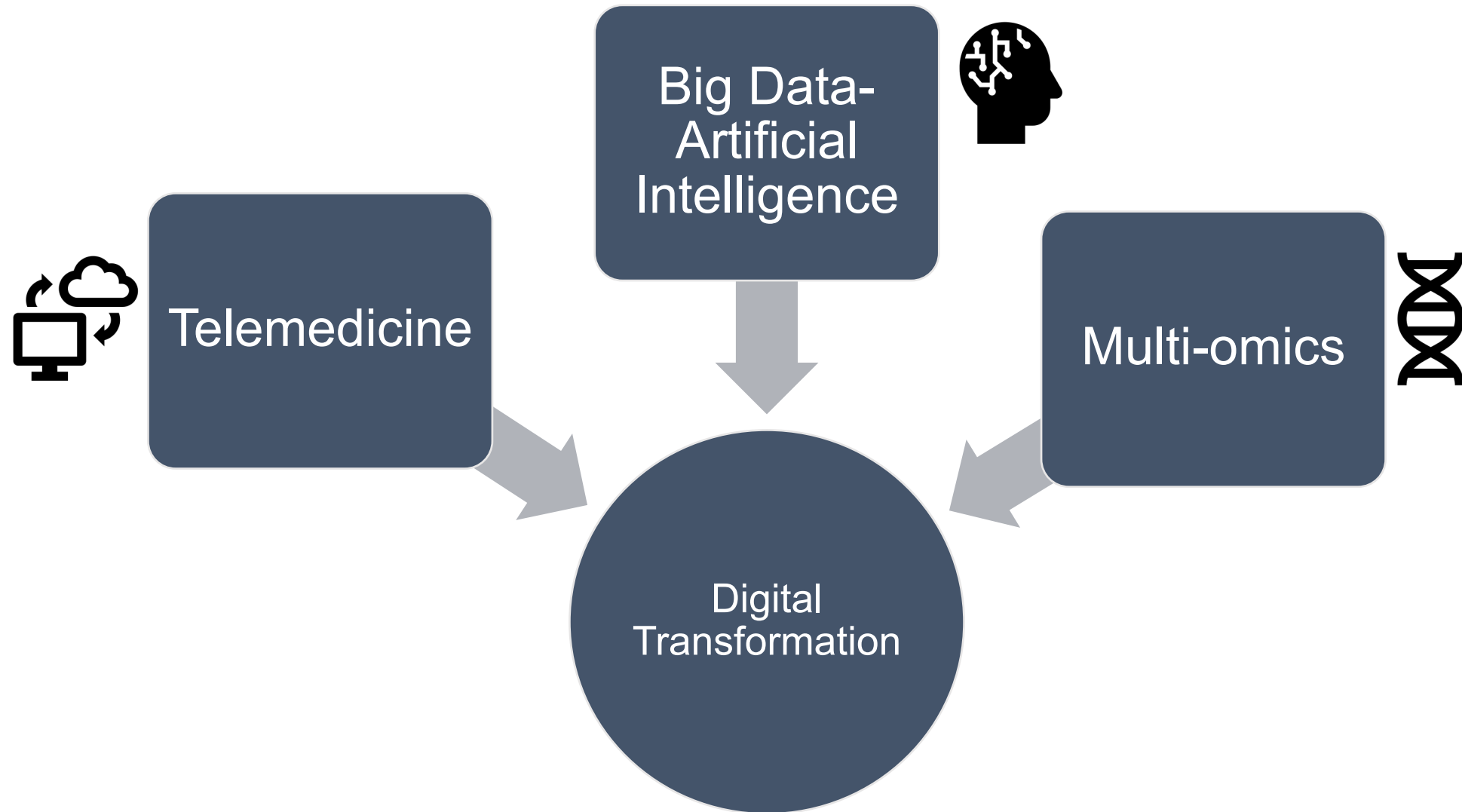biomarkers:
NT-proBNP

Challenges

high readmission rates

significant morbidity, mortality, and healthcare expenditure

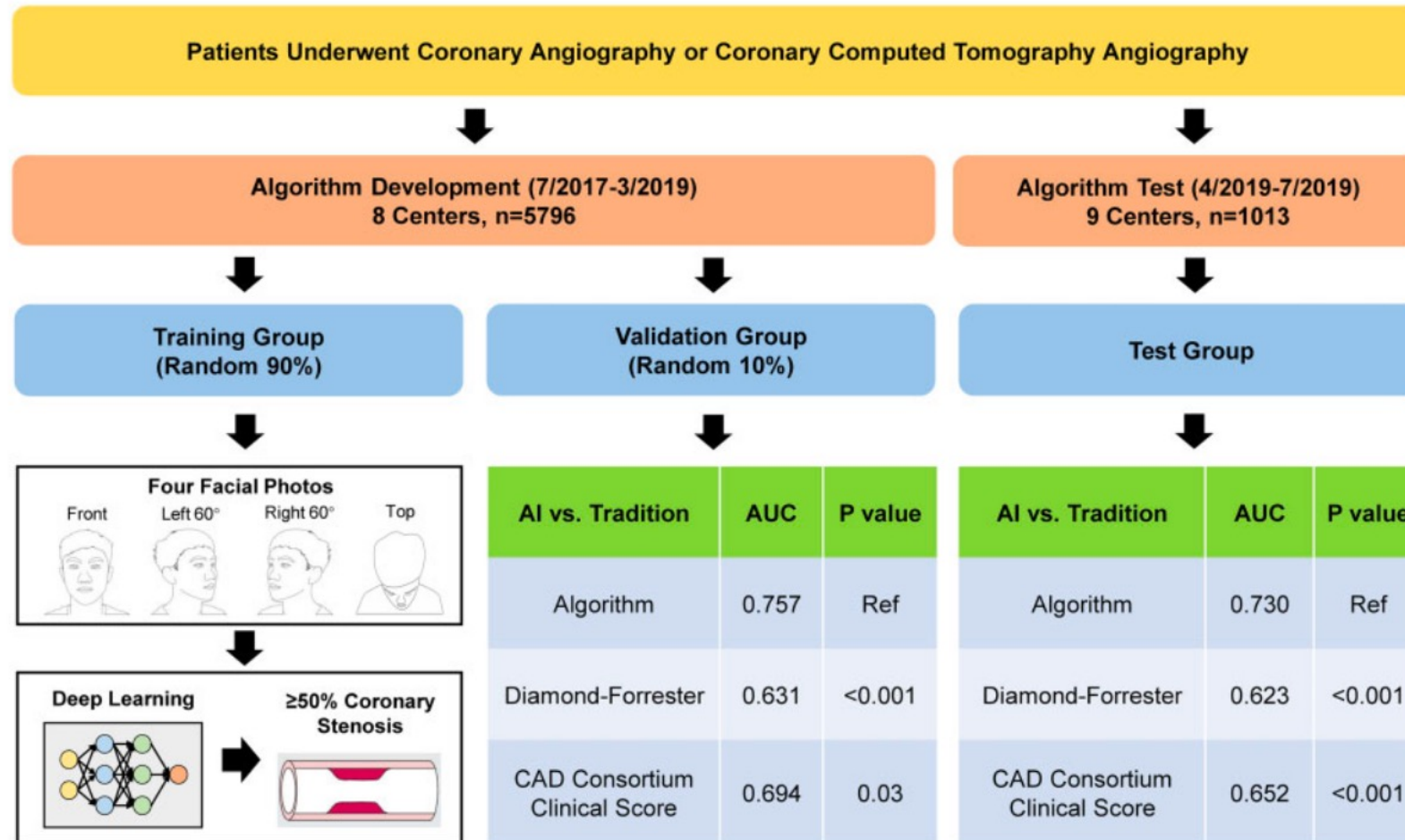emerging "new" diseases - HFpEF

early detection of "rare" diseases

The Era of Digital Transformation and Future Perspectives
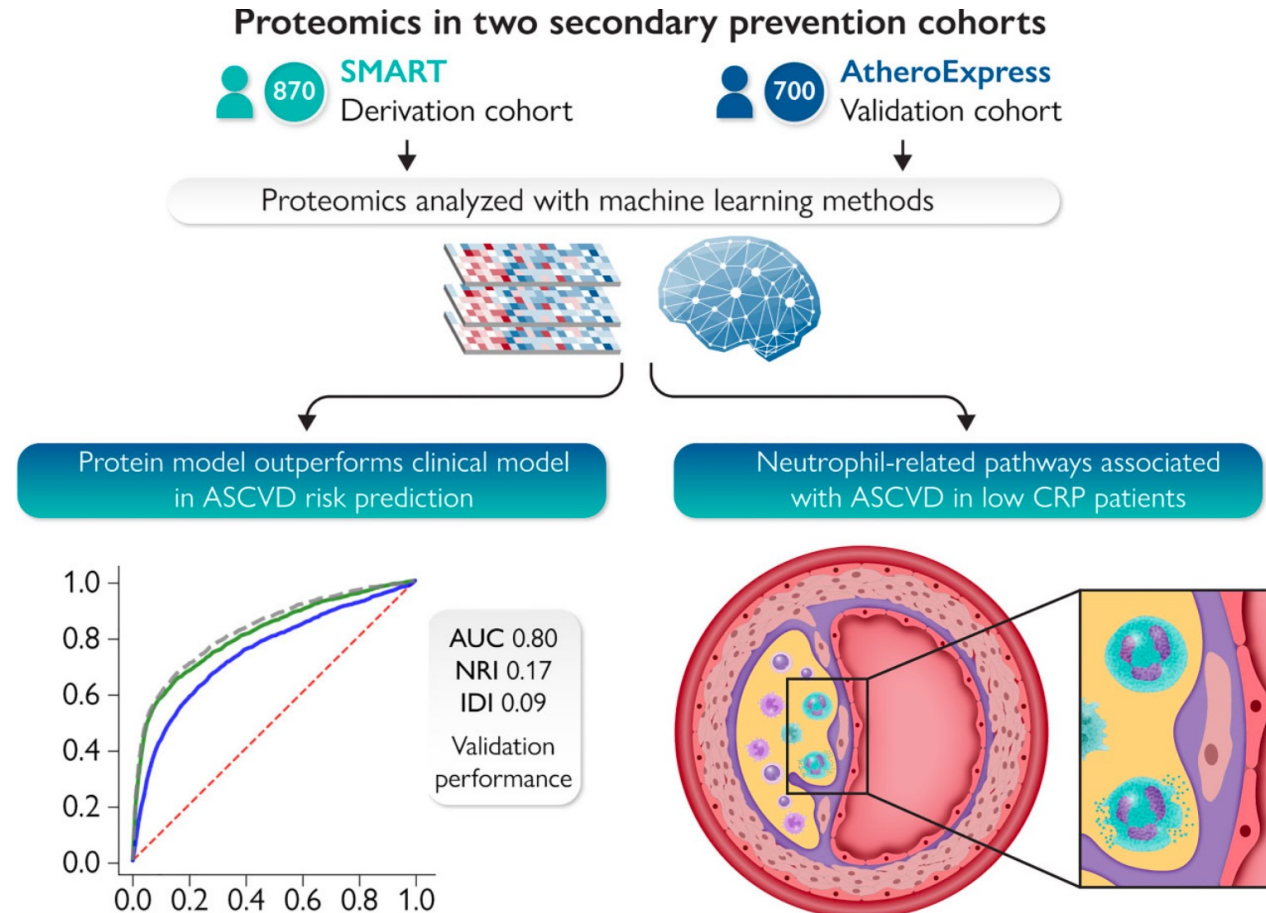
Digital Transformation

- Improving clinical risk scores to adjusted population groups

Feasibility of using deep learning to detect coronary artery disease based on facial photo

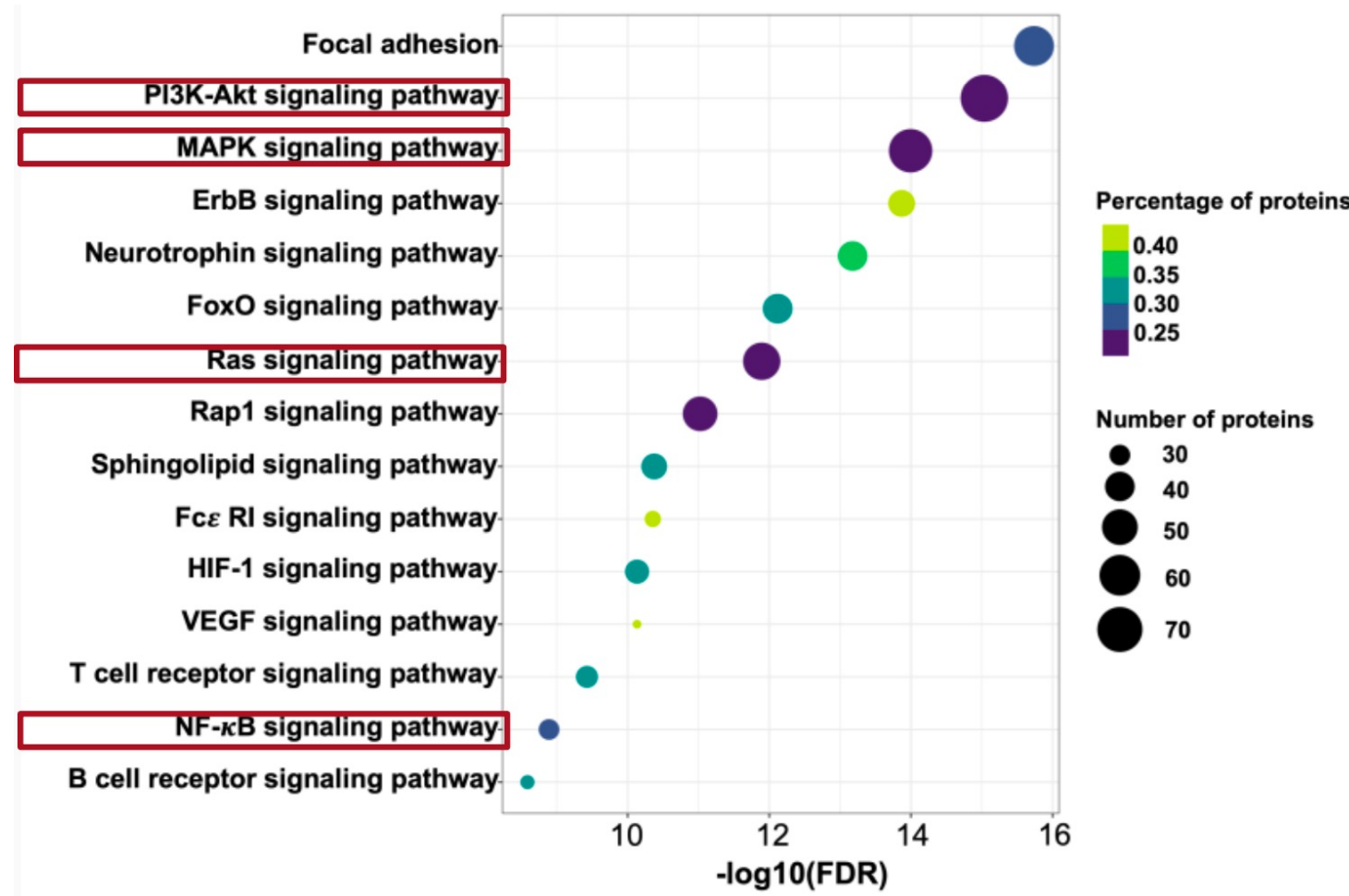Lin et al. EHJ 41, Issue 46; 2020, Pages 4400–4411

Targeted proteomics improves cardiovascular risk prediction in secondary prevention
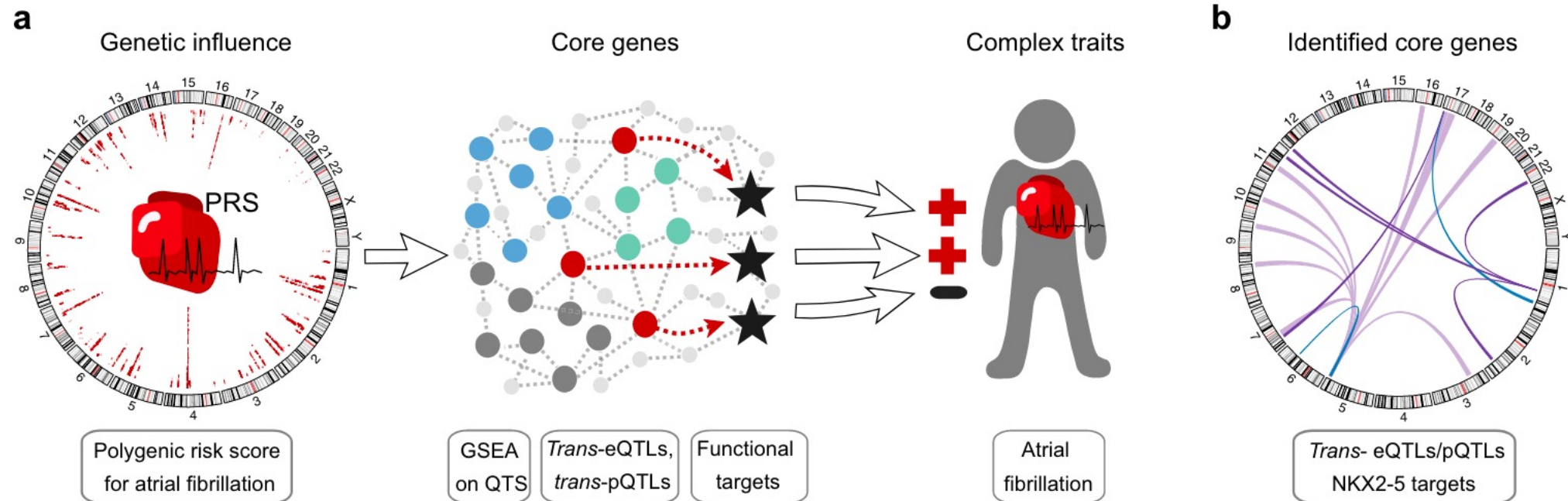

Nurmohamed N. et al., European Heart Journal (2022)43:1569-1577

- Making more personalized decisions

Proteomics profiling reveals a distinct high-risk molecular subtype of hypertrophic cardiomyopathy
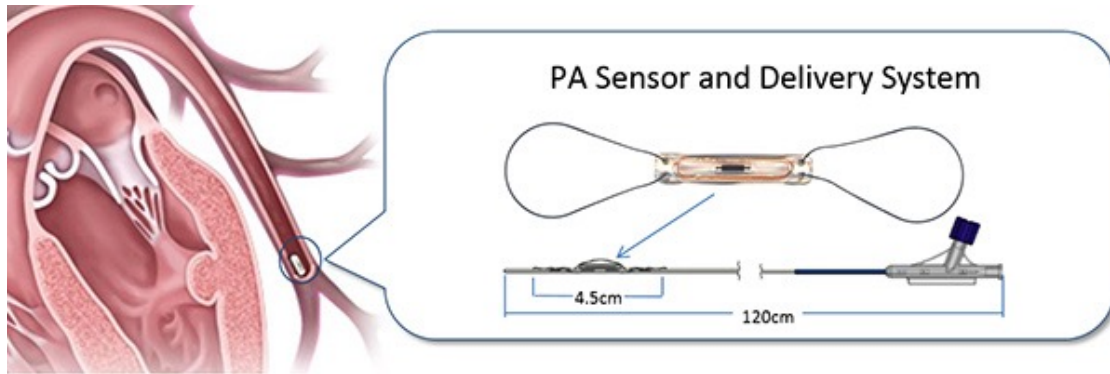
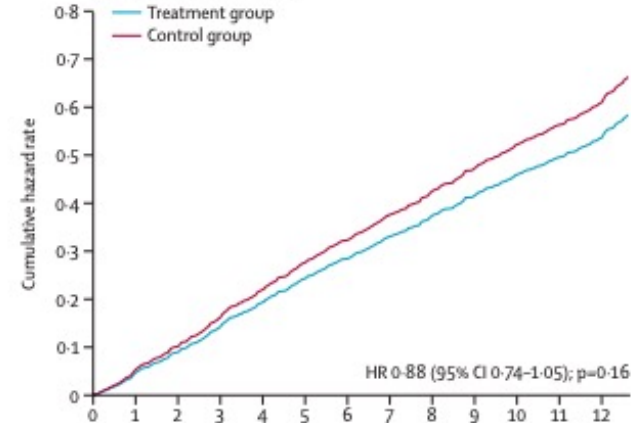# Tissue-specific multi-omics analysis of atrial fibrillation

Assun et al. Nature Communications; (2022)13:441

- Improving preventive measures to reduce hospitalizations

Hemodynamic GUIDEd Management of Heart Failure (GUIDE-HF)

Lindenfeld J et al., The Lancet, 2021; 398(10304), 991–1001

Impact of the COVID19 Pandemic

Haemodynamics, intensification of therapy and clinical outcomes in GUIDE-HF

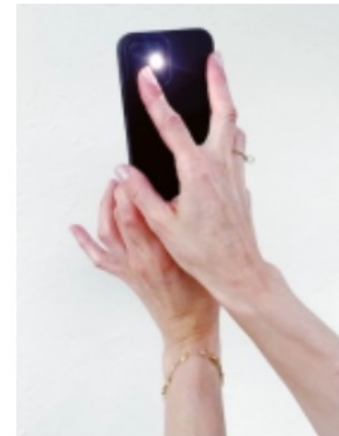|	Before lockdown		During lockdown	
	Control	Monitored	Control	Monitored
Therapy increase †	0.38	0.67	0.20	0.32
Therapy decrease †	0.27	0.41	0.18	0.22
Median change in daily mean PA pressure (mmHg) #	-1.5 (-1.8 to -1.0)	-2.1 (-2.5 to -1.7) p=0.016	-0.3 (-0.9 to -0.1)	-0.3 (-0.9 to 0) p=0.96
Median change in daily diastolic PA pressure (mmHg) #	-1.3 (-1.7 to -1.1)	-1.4 (-2.1 to -1.5) p=0.044	-0.3 (-0.8 to -0.1)	-0.1 (-0.7 to 0) p=0.71
Quality of life (KCCQ)	↑ by ~6 points	↑ by ~5 points	↑ by ~5 points	↑ by ~8 points
Exercise capacity	No change	No change	No change	No change
Hospitalisations for heart failure ‡	0.525	0.380 (p=0.007)	0.414	0.490 (p=0.38)
Mortality ‡	8.8%	11.0% (p=0.42)	8.5%	6.7% (p=0.59)

Ziele A. et al; Eur Heart J (2021) , ehac226, https://doi.org/10.1093/eurheartj/ehac226

Wearables: eBRAVE-AF Study

- Photoplethysmographic (PPG) sensors on smart devices can detect irregularities of pulse waves indicative of atrial fibrillation (AF)

PPG

ECG
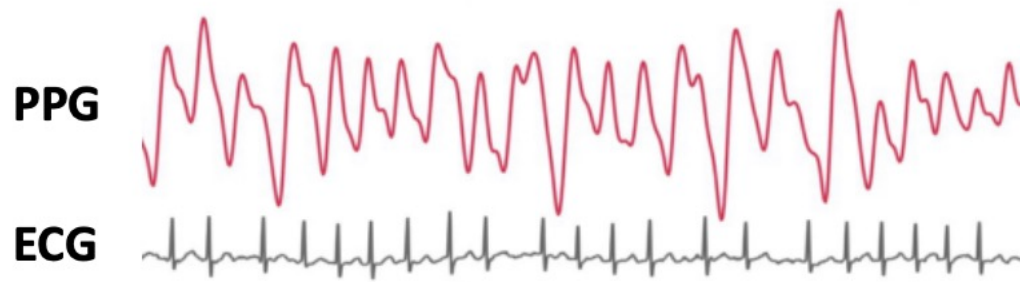
Väliaho et al., Front Physiol 2022

Rizas, K. D., et al. (2022). Smartphone-based screening for atrial fibrillation: a pragmatic randomized clinical trial. *Nature medicine*, *28*(9), 1823–1830. https://doi.org/10.1038/s41591-022-01979-w

BMT 2022
28.-30.09.2022 | Innsbruck
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- Improving early diagnosis of "rare" diseases

A machine learning-derived electrocardiographic algorithm for the detection of cardiac amyloidosis

Diagnosis of cardiac amyloidosis (CA) requires advanced imaging techniques. Typical surface ECG patterns have been described, but their diagnostic abilities are limited. The aim was to perform a thorough electrophysiological characterization in CA patients and derive an easy-to-use tool for diagnosis.
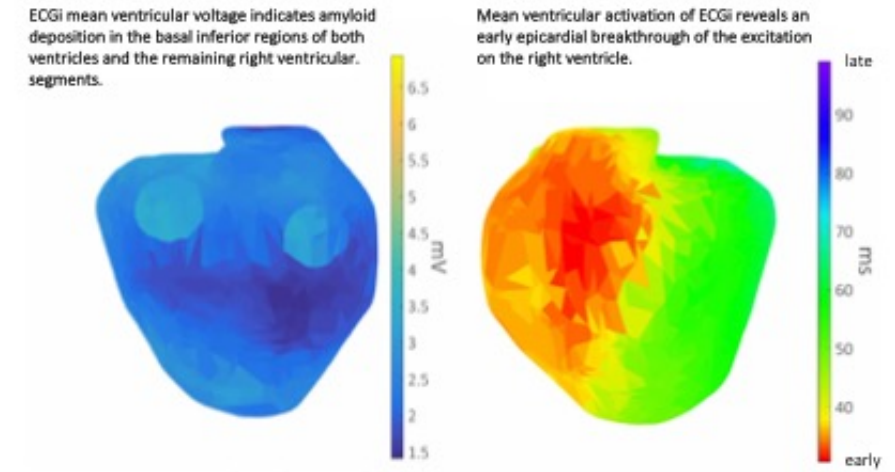

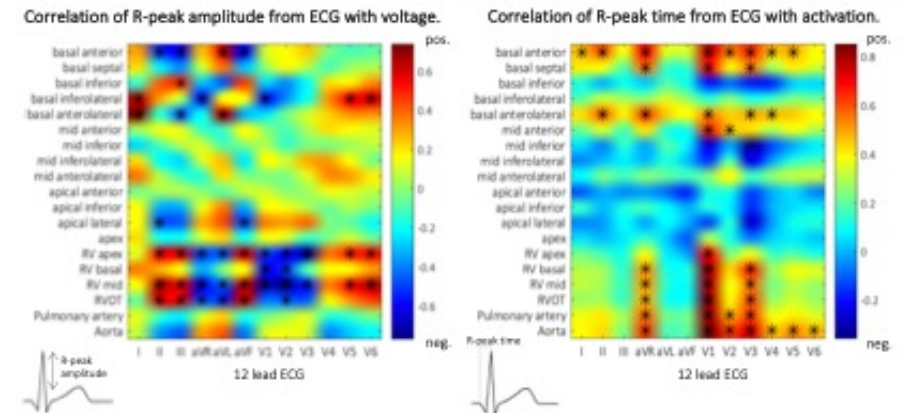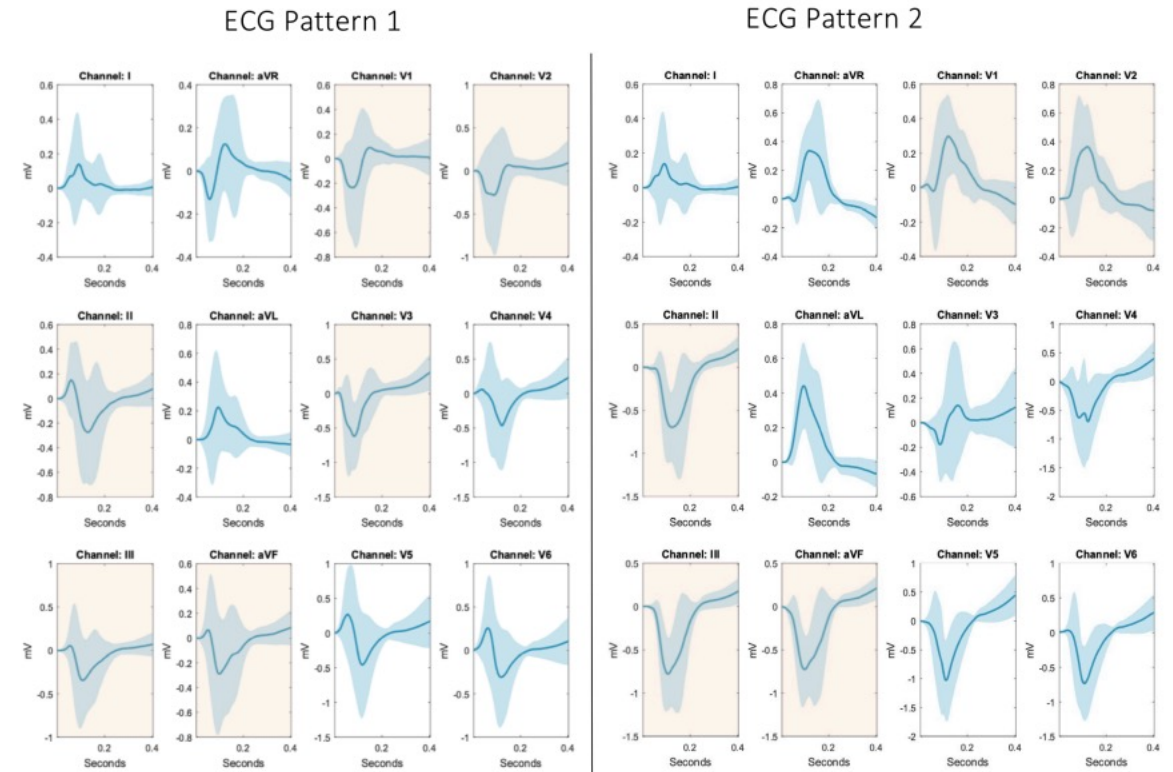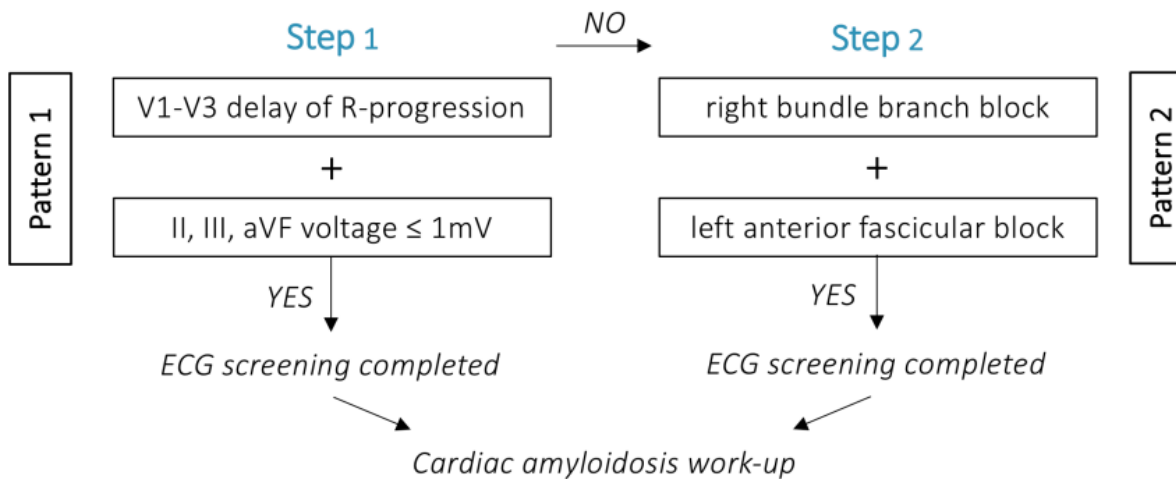Figure 1. Mean ventricular voltage and activation maps

Figure 2. Correlation between 12-lead ECG and ECGI in CA

Schrutka L. et al; Heart 2021;0:1–11.

ECG-Criteria as Indicator for Cardiac Amyloidosis

Schrutka L. et al; Heart 2021;0:1–11.

Limitations and Outlook

Big Challenges

- Harmonizing big data sets for an interdisciplinary approach

- "proof of concept" studies do not have clinical relevance yet

- Ethical Considerations of AI

Big Opportunities

- Focus on prioritizing preventive measures

- Improving clinical risk scores to adjusted population groups

- Improving current diagnostic methods (image- & signalbased)

- Personalized medicine – the future?

Thank you for
your attention!