DigiMed Bayern –
applications for patient-oriented digital medicine

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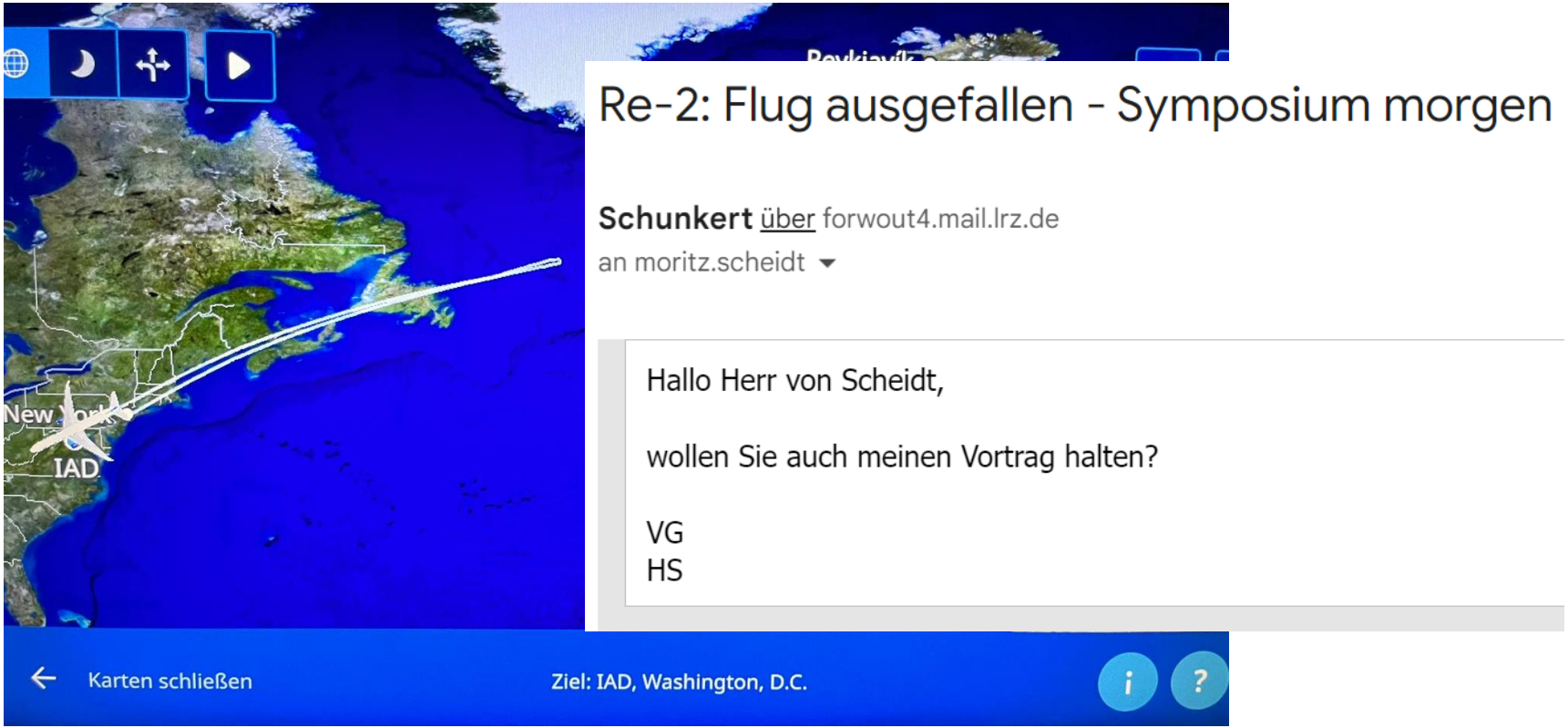
DigiMed Bayern

Bayerisches Staatsministerium für Gesundheit und Pflege

Technische Universität München

Deutsches Herzzentrum München
des Freistaates Bayern
Klinik a. d. Technischen Universität München

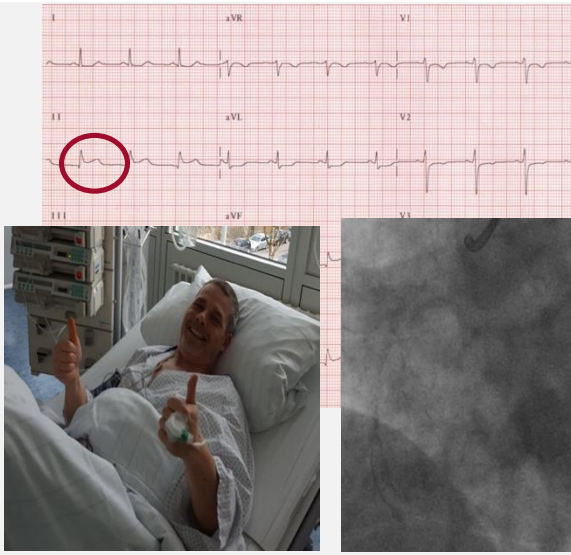
Warmest regards!



DigiMed Bayern – Background

Cardiovascular disease kills around 18 million people worldwide each year.
Heart attacks and strokes account for 85% of these cases.

44 years (m), 1,75 m, BMI 29
Angina for 4 h
CV risk factors:
- art. hypertension
- hypercholesterolemia
- positive family hx for CAD
- smoking



The family is suffering multiple heart attacks – still waiting for his diagnosis: FH

World Health Organization (WHO) 2019 – Global Health Estimates: Life expectancy and leading causes of death and disability

DigiMed Bayern – Aim

Developing applications and transferable infrastructures to improve patient care in coronary artery disease and stroke

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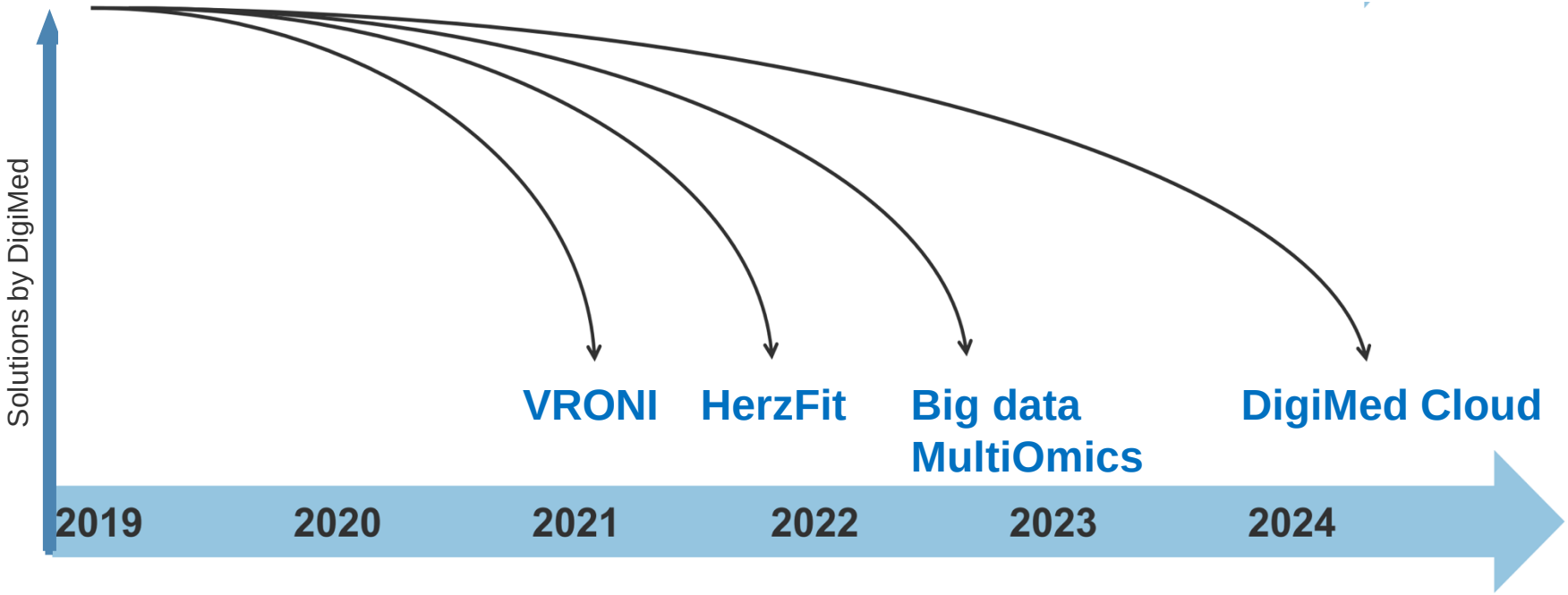
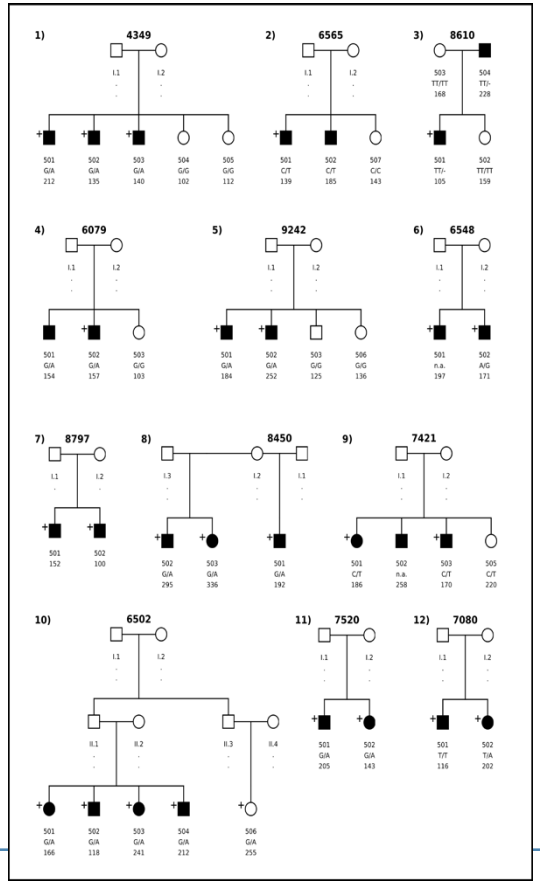
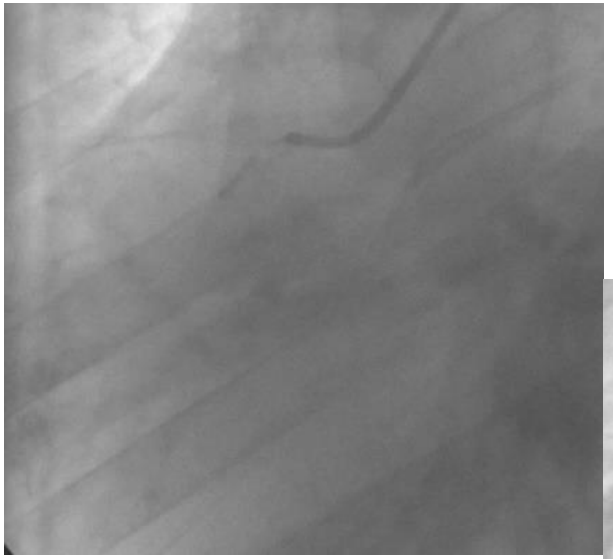
DigiMed Bayern – Main use cases



PREVENTION

Myocardial infarction patients < 55 years





1 in 10 MIs in this age group
is based on
familial hypercholesterolemia

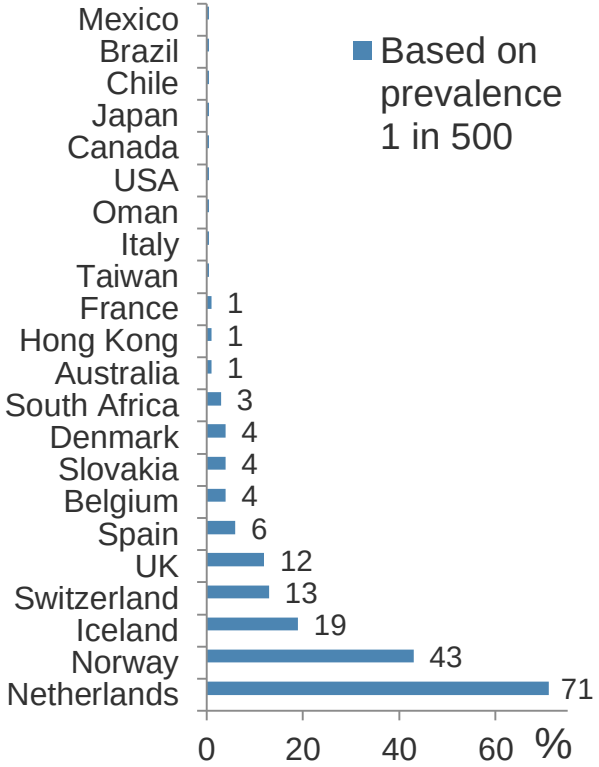
(whole exome sequencing in 255 families)

Braenne et al *Eur J Hum Genet* 2016;24:191-7

Familial hypercholesterolemia is not recognized

<15%

achieved the LDL-C treatment goal of <2.5mmol/L[1]



Diagnosed FH (estimated) in % of estimated number in each country

In most countries

<10%

of patients are diagnosed[2]

1. *Lancet* 2021; 398, 1713-1725
2. Eur Heart J 2013;34:3478–3490

Bavarian Screening for FH

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Vroni

DigiMed Bayern

Deutsches Herzzentrum München
des Freistaates Bayern
Klinik an der Technischen Universität München

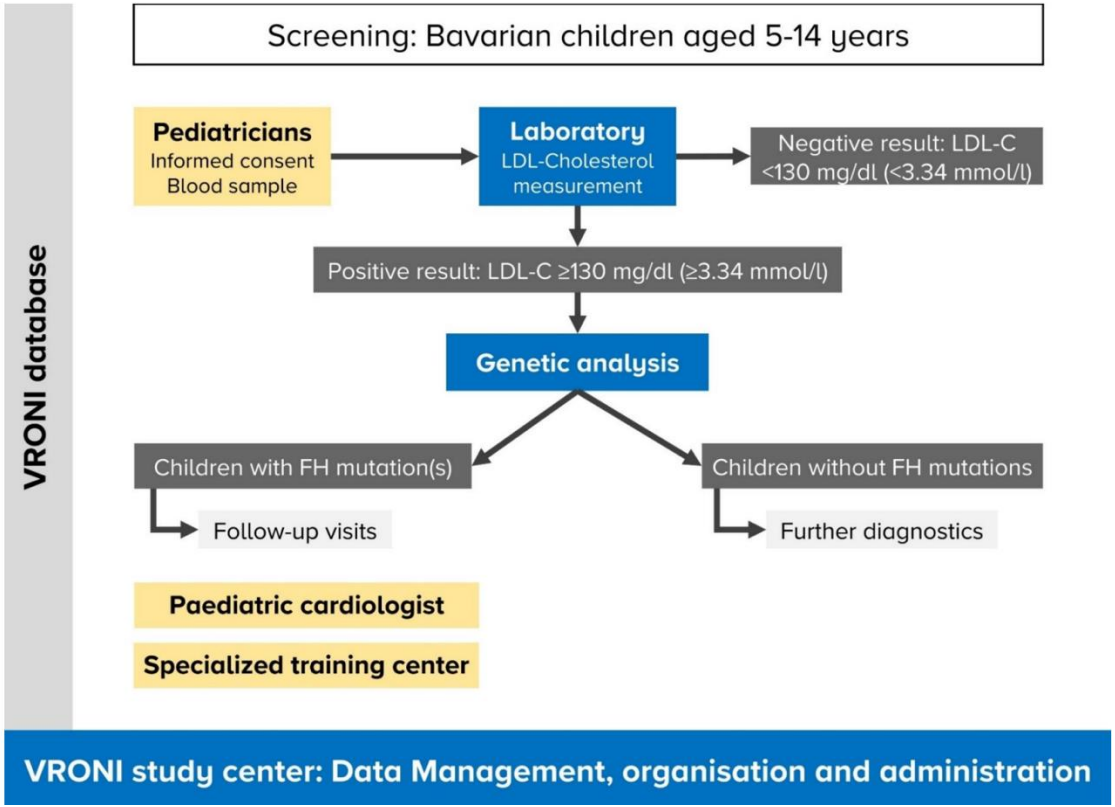
bvkj.
Berufsverband der
Kinder- und Jugendärzte e.V.

HelmholtzZentrum münchen
Deutsches Forschungszentrum für Gesundheit und Umwelt

gefördert durch
Bayerisches Staatsministerium für
Gesundheit und Pflege

Eur J Public Health 2022;32:422-428

VRONI – FH Screening in Bavaria



Sanin et al. - Population-based screening in children for early diagnosis and treatment of familial hypercholesterolemia. Eur J Public Health 2022

Bavarian Screening for FH

482 pediatricians

⇩

17.500 children screened

⇩

986 children LDL >130 mg/dl

⇩

178 children with FH mutation

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Vroni goes North

DGK.
Deutsche Gesellschaft für Kardiologie
German Cardiac Society

Bundesministerium für Gesundheit

Deutsche Herzstiftung

1. Verbesserung der Früherkennung bei Kindern und Jugendlichen

- Einführung eines Lipid-Screenings (mit Fokus auf Familiäre Hypercholesterinämie) bei der Früherkennungsuntersuchung U9 (mit anschließendem Kaskadenscreening von Familienangehörigen)
  → Festlegung der Untersuchungsinhalte durch die medizinischen Fachgesellschaften

Impulspapier

Früherkennung und Versorgung von Herz-Kreislauf-Erkrankungen

PARTICIPATION & PERSONALISATION

Risk Calculator

Deutsche Herzstiftung

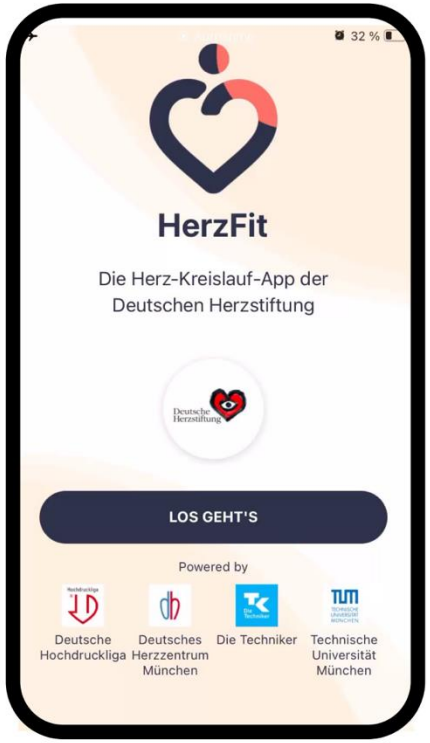
Herzinfarkt-Risiko-Test

Wie hoch ist Ihr Risiko für einen Herzinfarkt? Finden Sie es mit dem Herz-Risiko-Test der Deutschen Herzstiftung heraus.v

Zum Test

>30.000 clicks/month

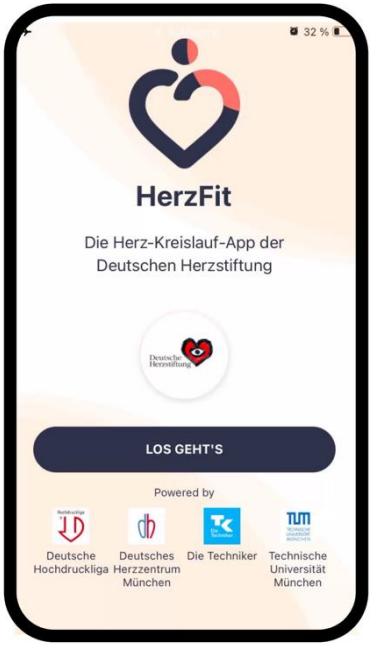
HerzFit App – Personalized companion

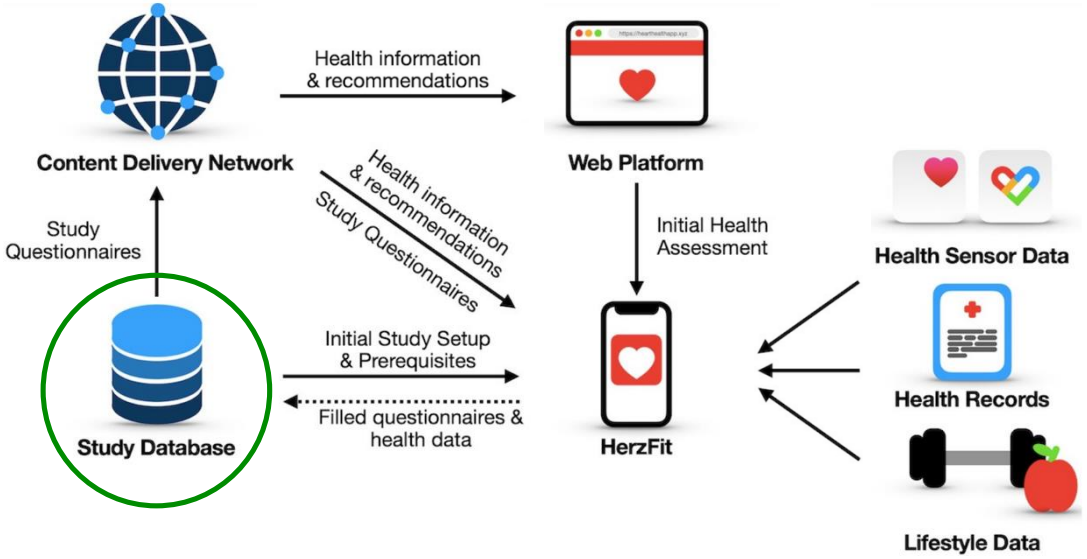


>100.000 downloads

Starnecker et al. – Cardiovascular risk assessment delivered by a mobile application Generation of the HerzFit app. **In press**

HerzFit App





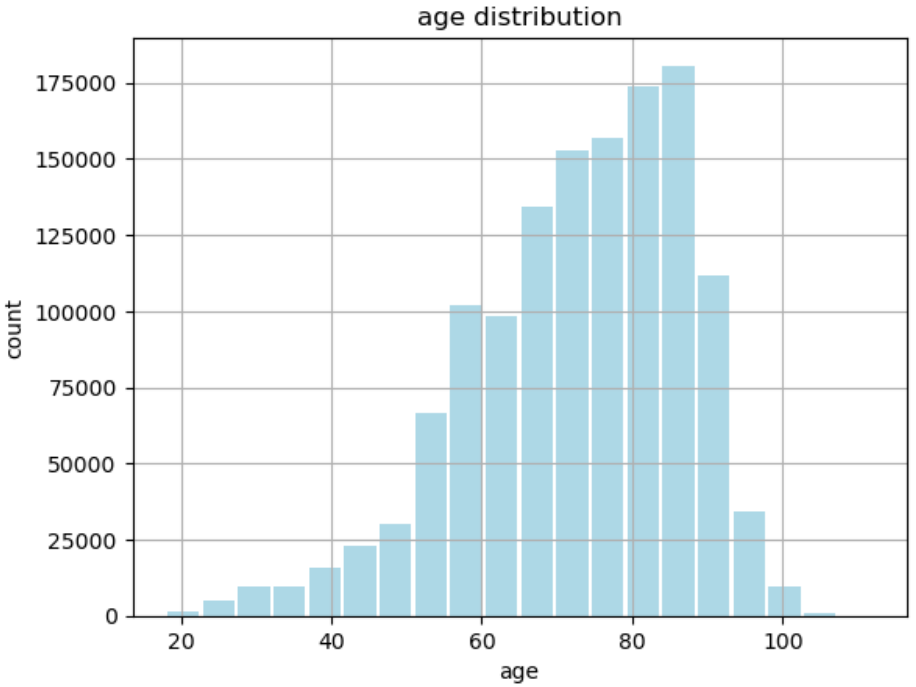
- Personalized long-term risk assessment tool and motivating companion

BIG DATA

Health insurance (big) data

AOK Bayern
Die Gesundheitskasse.

n=1.3 mio with ASCVD and 10y FU



Health insurance (big) data

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Ticagrelor or Prasugrel in Patients with Acute Coronary Syndromes

BACKGROUND

The relative merits of ticagrelor as compared with prasugrel in patients with acute coronary syndromes for whom invasive evaluation is planned are uncertain.

METHODS

In this multicenter, randomized, open-label trial, we randomly assigned patients who presented with acute coronary syndromes and for whom invasive evaluation was planned to receive either ticagrelor or prasugrel. The primary end point was the composite of death, myocardial infarction, or stroke at 1 year. A major secondary end point (the safety end point) was bleeding.

RESULTS

A total of 4018 patients underwent randomization. A primary end-point event occurred in 184 of 2012 patients (9.3%) in the ticagrelor group and in 137 of 2006 patients (6.9%) in the prasugrel group (hazard ratio, 1.36; 95% confidence interval [CI], 1.09 to 1.70; P=0.006). The respective incidences of the individual compo-

Emulation of IR5

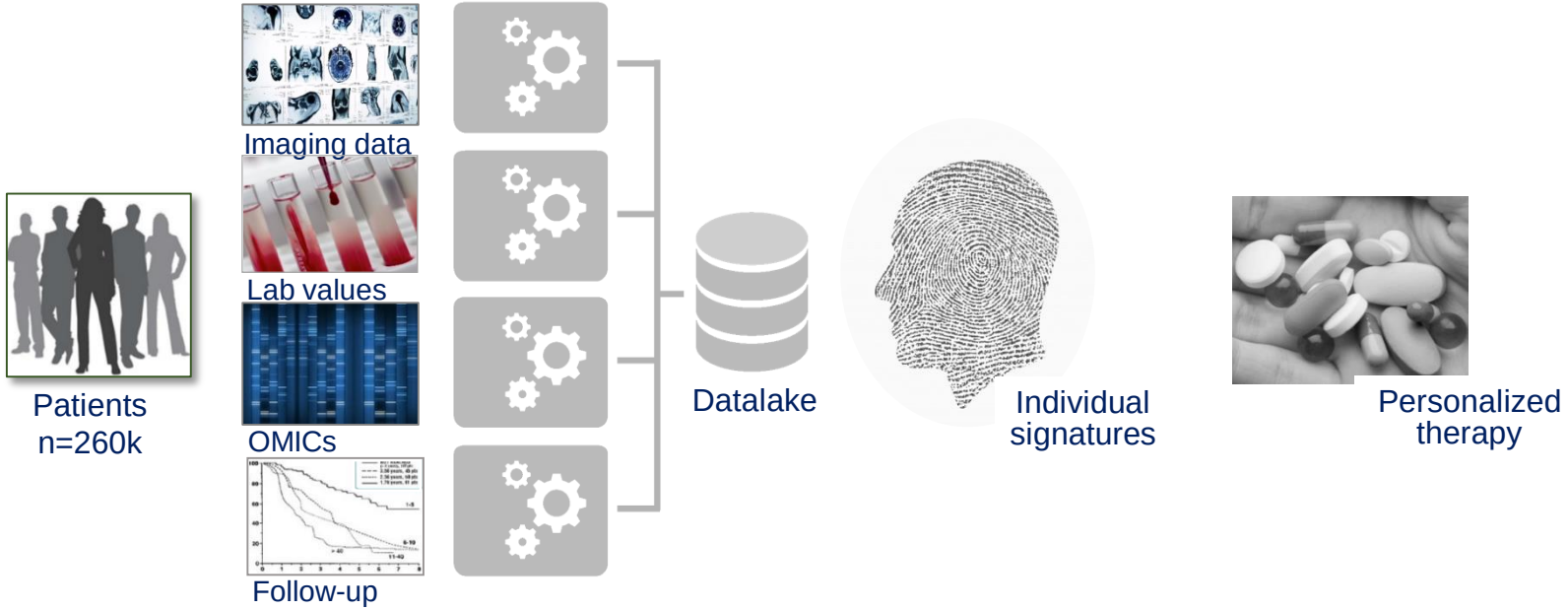
N Engl J Med. 2019;381:1524-1534

PREDICTION & PERSONALISATION

DigiMed Bayern – Improving risk prediction in CAD

Vision

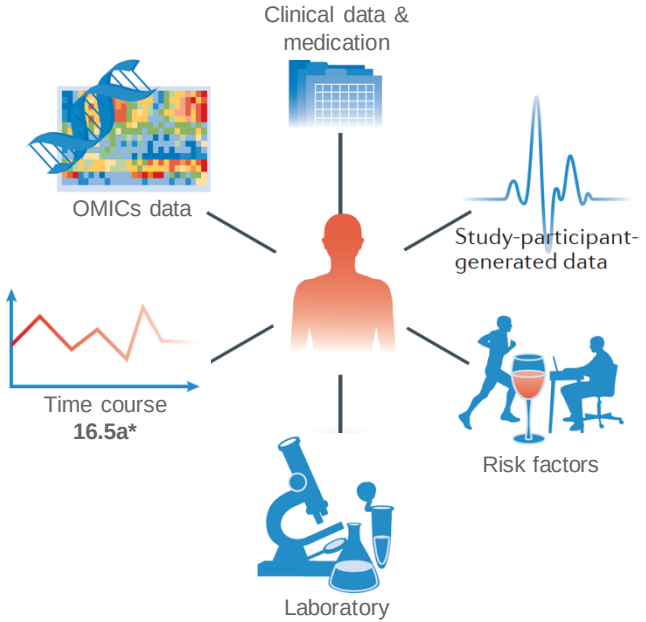
Understanding atherosclerosis through digital integral consideration of individual patient profiles



PRECAD Cohort – MultiOmics in CAD

CAD patients

n=1,202



Individual signatures

*comprising: CV-outcomes, risk factors, personal data, medication etc.

PRECAD Cohort – MS-based serum proteomics

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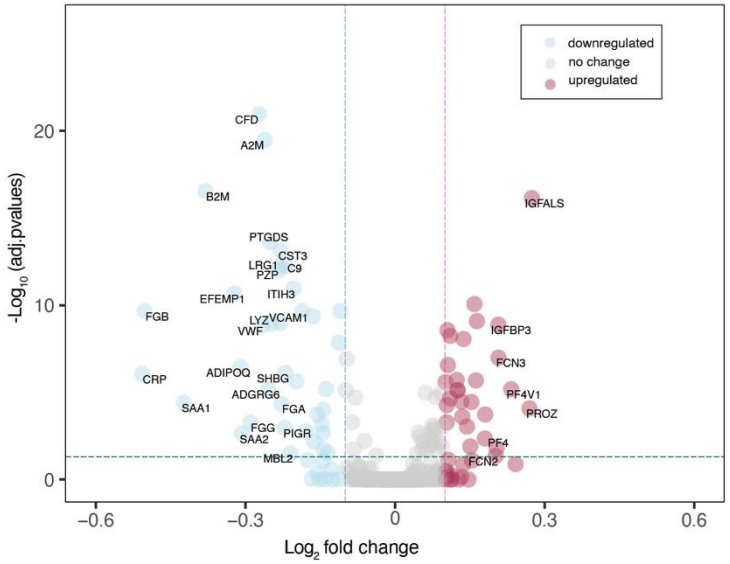
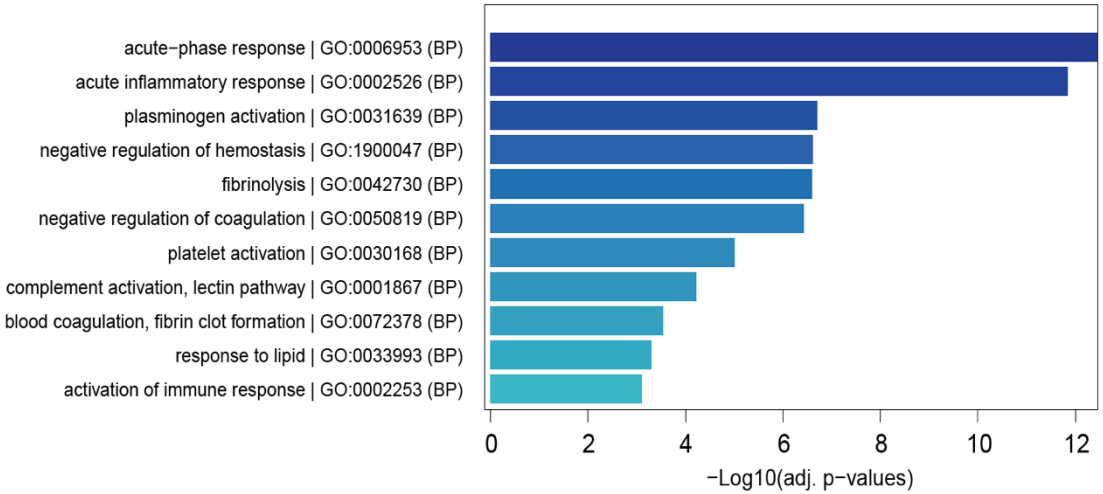
Does integration of proteomics improve mortality risk prediction?

All-cause death



Overrepresentation of biological processes



PRECAD Cohort – Conclusion

- We identified **mortality specific signatures on protein and pathway level** in CAD patients based on untargeted mass spectrometry
- We identified several proteins that **might serve as future biomarkers**, and potentially support identification or treatment of underlying mechanisms
- Integration of **proteomics outperformes existing clinical prediction models** recommended in secondary prevention

Individual signatures

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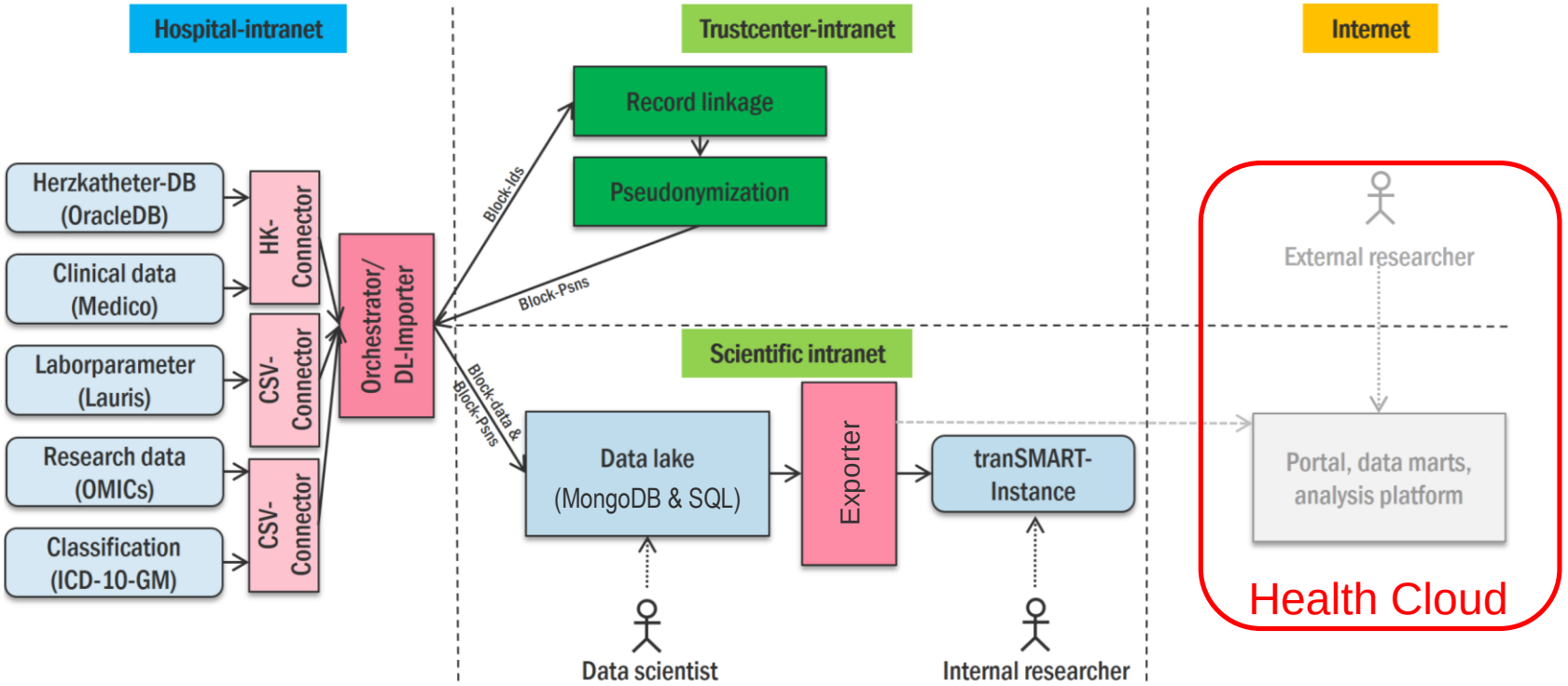
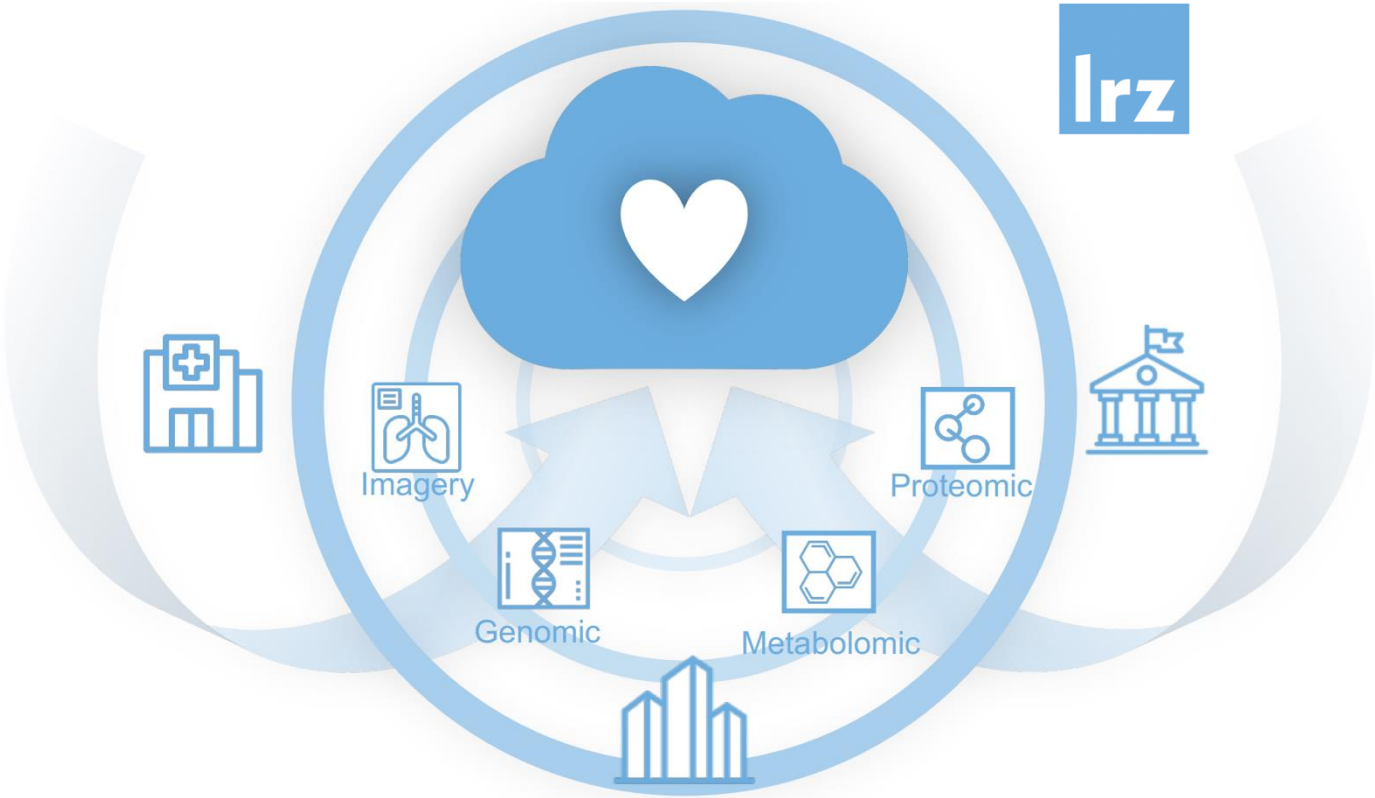
INFRASTRUCTURE

Infrastructure – DigiMed Cloud



Infrastructure – DigiMed Cloud



Federal Ministry of Education and Research

MEDIZIN INFORMATIK INITIATIVE

netzwerk universitäts medizin

DigiMed Bayern – TAKE HOME MESSAGES

- Based on the use case “**atherosclerosis**”, first analyses of comprehensive data sets has been carried out for **improvements in prediction, prevention, diagnosis and therapy**.

- Technical, legal and social **possibilities and limitations of P4 medicine** have been identified, promoted, and documented. This encompasses multi-directional information exchange with a focus on **systemic development**.

- Resulting findings and structures can be built upon in the health system, in research and in the economy, and can be transferred to **other diseases**. In particular, we created an exemplary and **transferable integrated digital infrastructure** (DigiMed Bayern Cloud).

DigiMed Bayern – Project board

Scientific lead (DHM)


Non-profit Management (BioM)


The Bavarian State Ministry of Health and Care supports *DigiMed Bayern* with 25 million euros to fight atherosclerosis (2019-2024).

DigiMed Bayern

Bayerisches Staatsministerium für Gesundheit und Pflege

Thank you for your attention!

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Klinik an der Technischen Universität München

DigiMed Bayern

lrz

Vroni

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