Applications of More Personalized Medicine in 2019

Folkert W. Asselbergs
Personalized medicine in Cardiology in 2019

**Cancer**
- Tissue biopsy
- Imaging
- Phenotypic analysis
  - Tumor size, extent
  - Histologic analysis
- Gene expression

**Targeted therapy**

**HF**
- Imaging, ECG, PEX
- Phenotypic analysis
  - Quantify LVEF
  - Functional class
  - Fluid status
  - QRS duration

**Sub-optimal one-size-fits-all approach**

**Non-targeted therapy**
One-size fits all?
The Relentless Pursuit of Better Insights

WE NEVER GIVE UP. We strive to do more for cancer patients - through richer science, deeper insights, and stronger partnerships - providing better cancer care today, and fueling better cancer care tomorrow.

Valuable Insights, Actionable Options

We help match each patient's unique genomic profile to known targeted therapies, immunotherapies and clinical trials and offer decision support services, financial assistance, and technology solutions to help streamline patient care.
A collaboration with the FDA: new insights using real-world evidence

This latest study estimates real-world survival rates of immunotherapy-treated patients in the first year following regulatory approval in lung cancer, illustrating real-world performance of a new therapy class...

U.S. FDA APPROVES IBRANCE® (PALBOCICLIB) FOR THE TREATMENT OF MEN WITH HR+, HER2-METASTATIC BREAST CANCER

Approval of expanded indication based predominately on real-world data

TriNetX Live™

Apply a Data-Driven Approach for Clinical Trial Optimization

- Real-time scenario modeling for protocol feasibility
- Directly connect with sites on trial opportunities
- Self-service access to fresh patient data
Welcome to CALIBER!

A comprehensive, open-access resource providing the research community with information, tools and phenotyping algorithms for UK electronic health records data.

EHR Phenotypes

Rule-based phenotyping algorithms using four national structured UK EHR data sources: primary care (CPRD), hospitalizations (HES) and mortality (ONS). Phenotypes have been extensively validated by generating six layers of evidence: astological, prognostic, case-note review, genetic, cross-EHR and cross-country replication.
Precision medicine in cardiology today

Probably past as considered medical device..
Clinical decision support

Uniform data collection in routine clinical practice in cardiovascular patients for optimal care, quality control and research: The Utrecht Cardiovascular Cohort
Eur J Prev Cardiol. 2017 May;24(8):840-847

Alert-based computerized decision support for high-risk hospitalized patients with atrial fibrillation not prescribed anticoagulation: a randomized, controlled trial (AF-ALERT)

Big data in cardiology today

94% accuracy echoview
91% accuracy LVH
93% accuracy HCM
87% accuracy cardiac amyloidosis

npj Digital Medicine (2018) 1:59
Circulation. 2018;138:1623

Predictive modelling

**Cell**

Polygenic Prediction of Weight and Obesity Trajectories from Birth to Adulthood

- Genome-wide polygenic score for weight and obesity
- 0.06, 3.5, 12.3, 13
- Birth, Age 8, Age 18, Middle age
- Difference in weight (kg): high and low score
- Increased risk for:
  - Extreme obesity
  - Bariatric surgery
  - Coronary disease
  - Heart failure
  - Mortality

Khera et al., 2019, Cell 177, 587–596

An artificial intelligence-enabled ECG algorithm for the identification of patients with atrial fibrillation during sinus rhythm: a retrospective analysis of outcome prediction

Zachhi Attia*, Peter A Noseworthy*, Francisco Lopez-Jimenez, Samuel J Asravatham, Abhishek J Deshmukh, Bernard J Gersh, Rickey E Carter, Xiaosi Yao, Alejandro A Rabinstein, Brad J Erickson, Sunil Kapur, Paul A Friedman

Lancet. 2019 Aug 1
Real-time Predictive modelling within routine care
Exposome
Sensors

But what then? Where is the evidence?
Big Data for Personalized medicine: challenges today
Big data for personalized medicine: big possibilities

• Molecular diagnosis to design future trials to provide targeted therapy

• AI analytics of real-world data for prediction and diagnostic yield will lead to actionable insights

• However, it is all about phenotype, phenotype, phenotype (new and old)

• Harmonization of clinical care pathways, data models, coding key for success (external validation)

• Multi-disciplinary collaboration essential
This work has received support from the EU/EFPIA Innovative Medicines Initiative [2] Joint Undertaking BigData@Heart grant n° 116074