



Nightingale

# How comprehensive metabolic profiling can enrich the UK Biobank sample collection

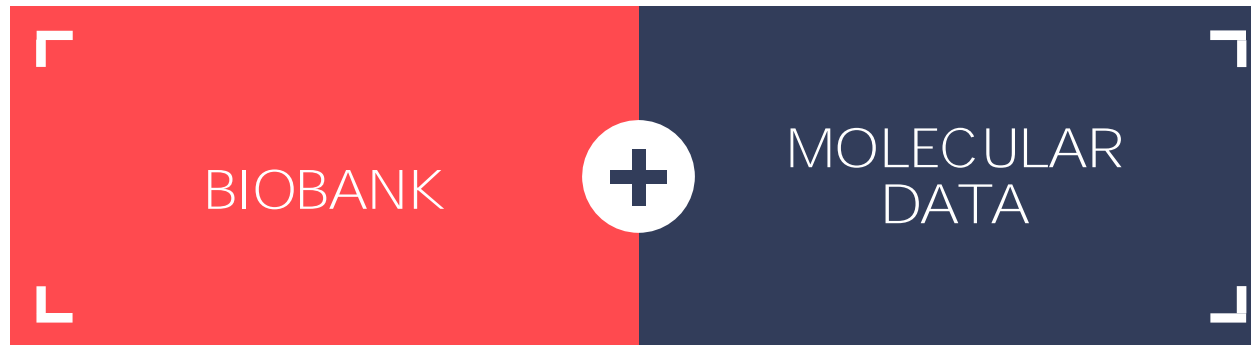
Peter Würtz, Scientific Director and co-founder  
21 June 2018, UK Biobank Scientific Conference

# **Making precision medicine a reality**

How can we get the best research out of large biobank collections?



How can we get the best research out of large biobank collections?



# Metabolic profiling of the entire UK Biobank collection

*Announcing...*

**Nightingale and UK Biobank will embark on a major initiative to analyse 500,000 volunteer blood samples to facilitate global medical research.**

# Nightingale's technology

*One sample, One test, Comprehensive metabolic profile*



*Routine lipids  
14 lipoprotein subclasses  
Particle size  
Apolipoproteins  
Fatty acids  
Omega-3 and -6  
Amino acids  
Ketones  
Inflammation  
Fluid balance  
Glycolysis*



# Comprehensive metabolic profiling

## Cholesterol (mmol/l)

- Total cholesterol
- VLDL cholesterol
- IDL cholesterol
- LDL cholesterol
- HDL cholesterol
- HDL 2 cholesterol
- HDL 3 cholesterol
- Remnant cholesterol
- Free cholesterol
- Esterified cholesterol

## Glycerides & phospholipids (mmol/l)

- Total triglycerides
- VLDL triglycerides
- IDL triglycerides
- LDL triglycerides
- HDL triglycerides
- Phosphoglycerides
- Ratio of triglycerides to phosphoglycerides
- Total cholines
- Phosphatidylcholines
- Sphingomyelins

## Apolipoproteins (g/l)

- Apolipoprotein A-I
- Apolipoprotein B
- ApoB/ApoA-I

## Fatty acids and saturation

- Total fatty acids
- Estimated degree of unsaturation

## Fatty acids

- (mmol/l and % of total FAs)
- Omega-3 fatty acids
- Omega-6 fatty acids
- Polyunsaturated fatty acids
- Monounsaturated fatty acids
- Saturated fatty acids
- Docosahexaenoic acid
- Linoleic acid

## Ketone bodies (mmol/l)

- Acetate
- Acetoacetate
- 3-hydroxybutyrate

## Glycolysis related metabolites (mmol/l)

- Glucose
- Lactate
- Pyruvate\*
- Citrate
- Glycerol\*

## Fluid balance

- Creatinine
- Albumin

## Inflammation (mmol/l)

- Glycoprotein acetylation (GlycA)

## Amino acids (mmol/l)

- Alanine
- Glutamine
- Glycine\*
- Histidine

## Branched-chain amino acids

- Isoleucine
- Leucine
- Valine

## Aromatic amino acids

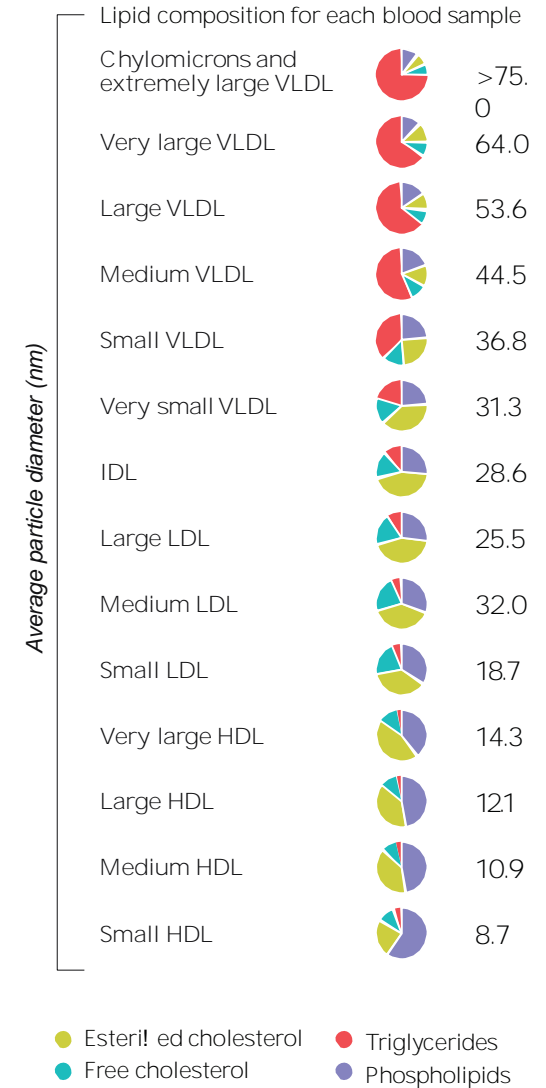
- Phenylalanine
- Tyrosine

## Lipoprotein particle size (nm)

- Mean diameter of VLDL particles
- Mean diameter of LDL particles
- Mean diameter of HDL particles

## Particle concentration and lipid composition for 14 lipoprotein subclasses

- Total lipids (mmol/l)
- Particle concentration (µmol/l)
- Cholesterol (mmol/l and % of total lipids)
- Esterified cholesterol (mmol/l and % of total lipids)
- Free cholesterol (mmol/l and % of total lipids)
- Triglycerides (mmol/l and % of total lipids)
- Phospholipids (mmol/l and % of total lipids)



# Nightingale Health Ltd.

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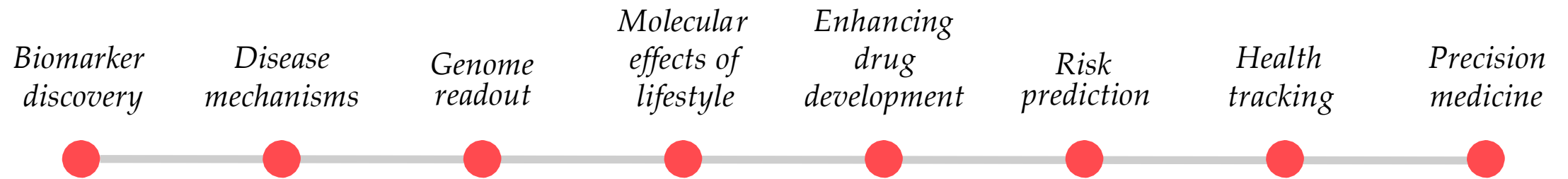
Specialized in **comprehensive metabolic profiling** by NMR.

**500,000** blood samples analyzed.

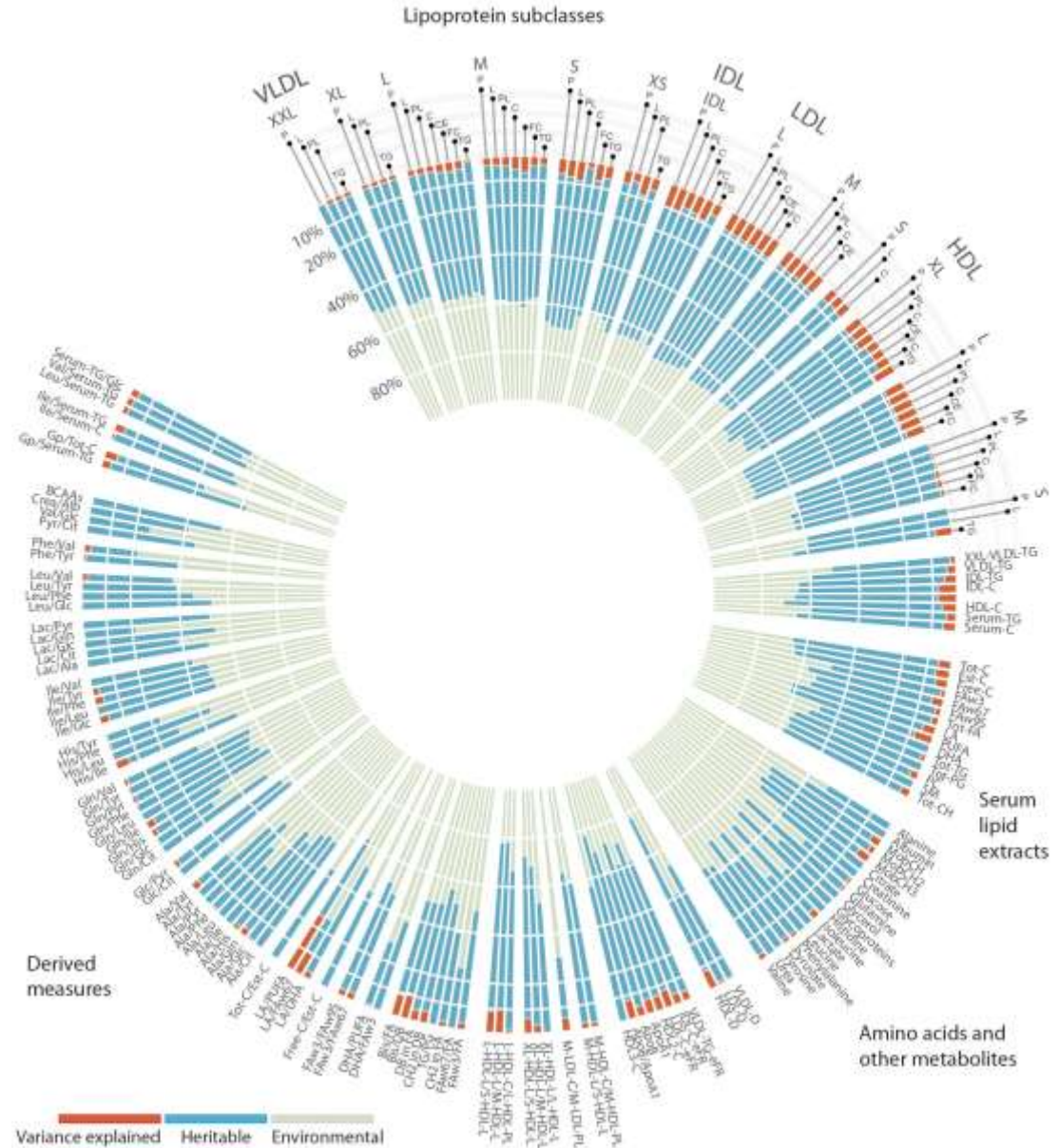
**150+** scientific publications.

From **biomedical science** towards **clinical use**.

# Endless scientific opportunities



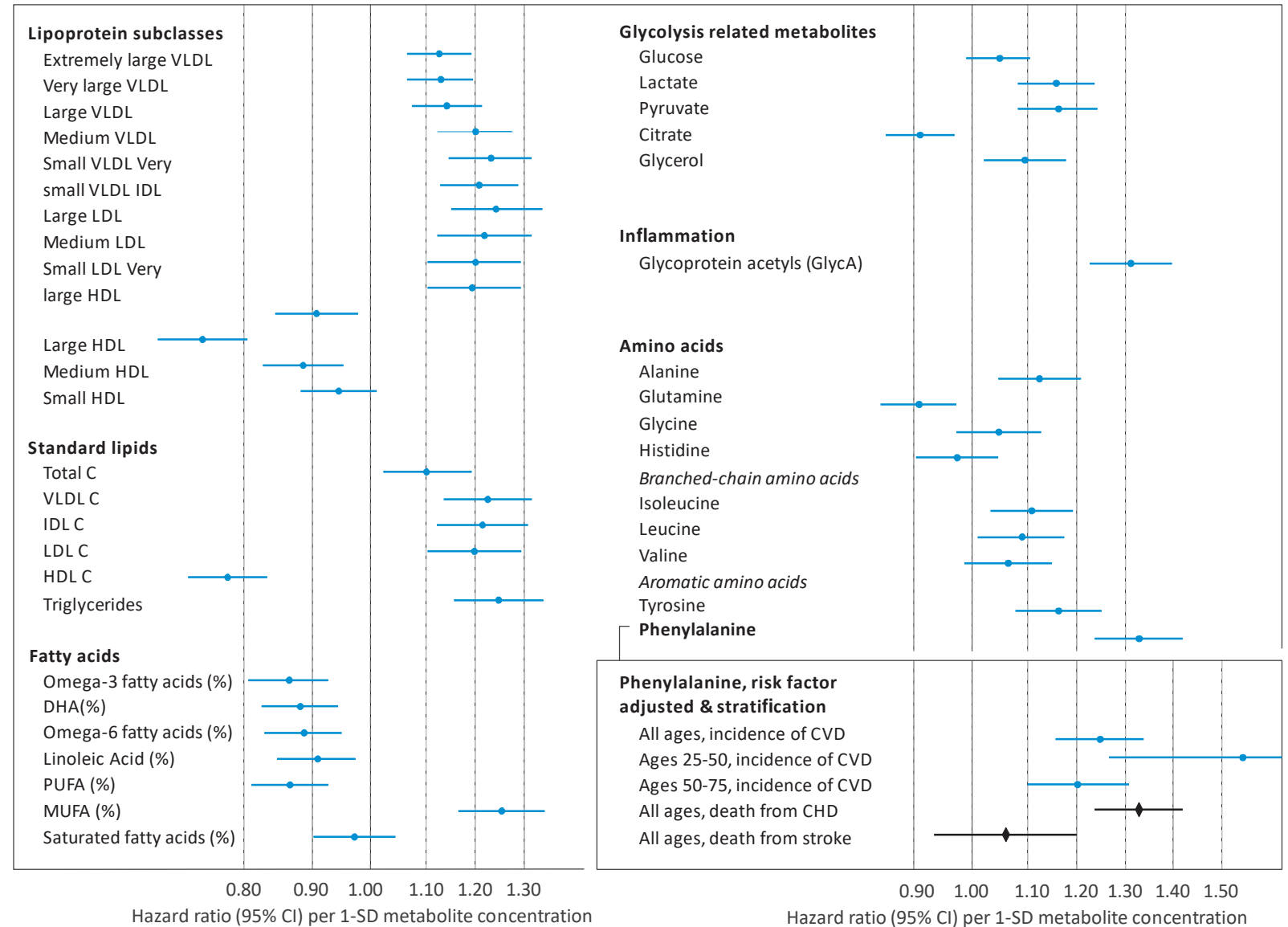
# Combining metabolic profiling with genetics



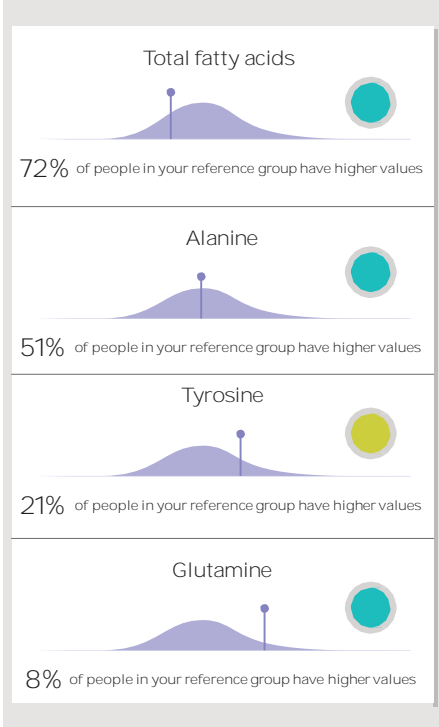
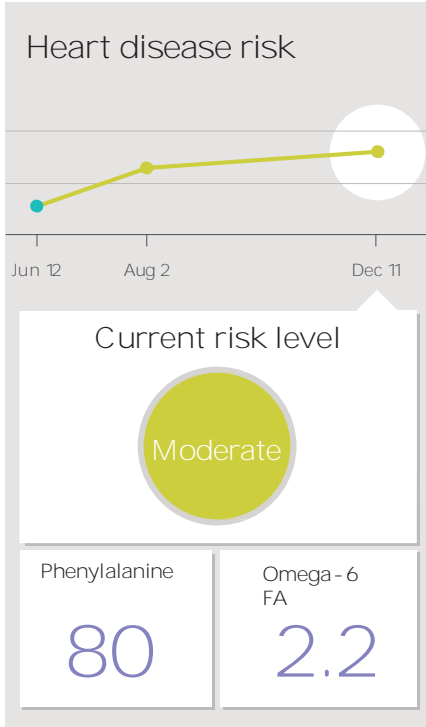
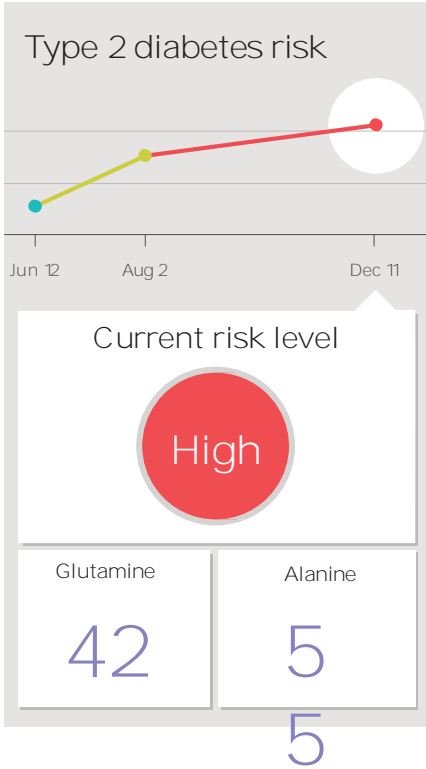
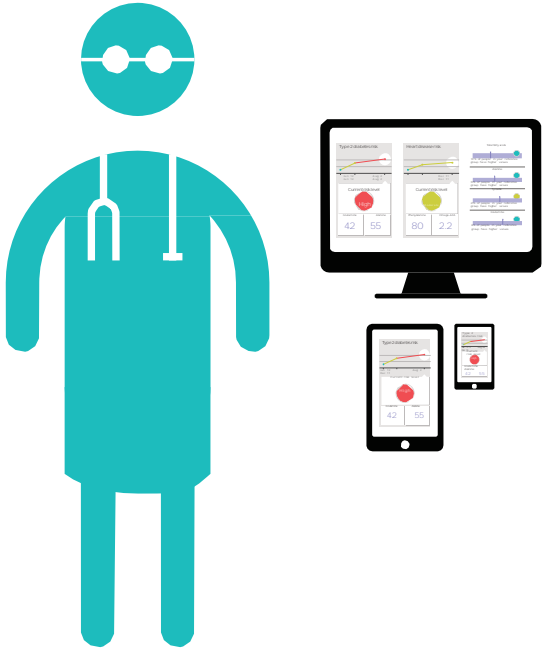
# Enhanced drug development



# Biomarker discovery and risk prediction



# Better clinical decision-making



“It is time to advance NMR spectroscopy and mass spec technologies for lipoprotein and apolipoprotein profiling to meet the **high throughput, low cost, and standardization** required for potential clinical use.”

- Dr Manuel Mayr (Journal of American College of Cardiology 2018)



# Thank you!

Founder, Scientific Director

Peter Würtz

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