



Fat distribution matters!

Findings from the first 6,000 UKBB participants

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Overweight and Obesity Definitions Today



$$\text{BMI}^* = \text{Weight}/\text{Height}^2$$

(82 kg/1,82² m = 24,8)

<18,5

Underweight

18,5 – 24,9

Normal

25,0 – 29,9

Overweight

>30

Obese

>40

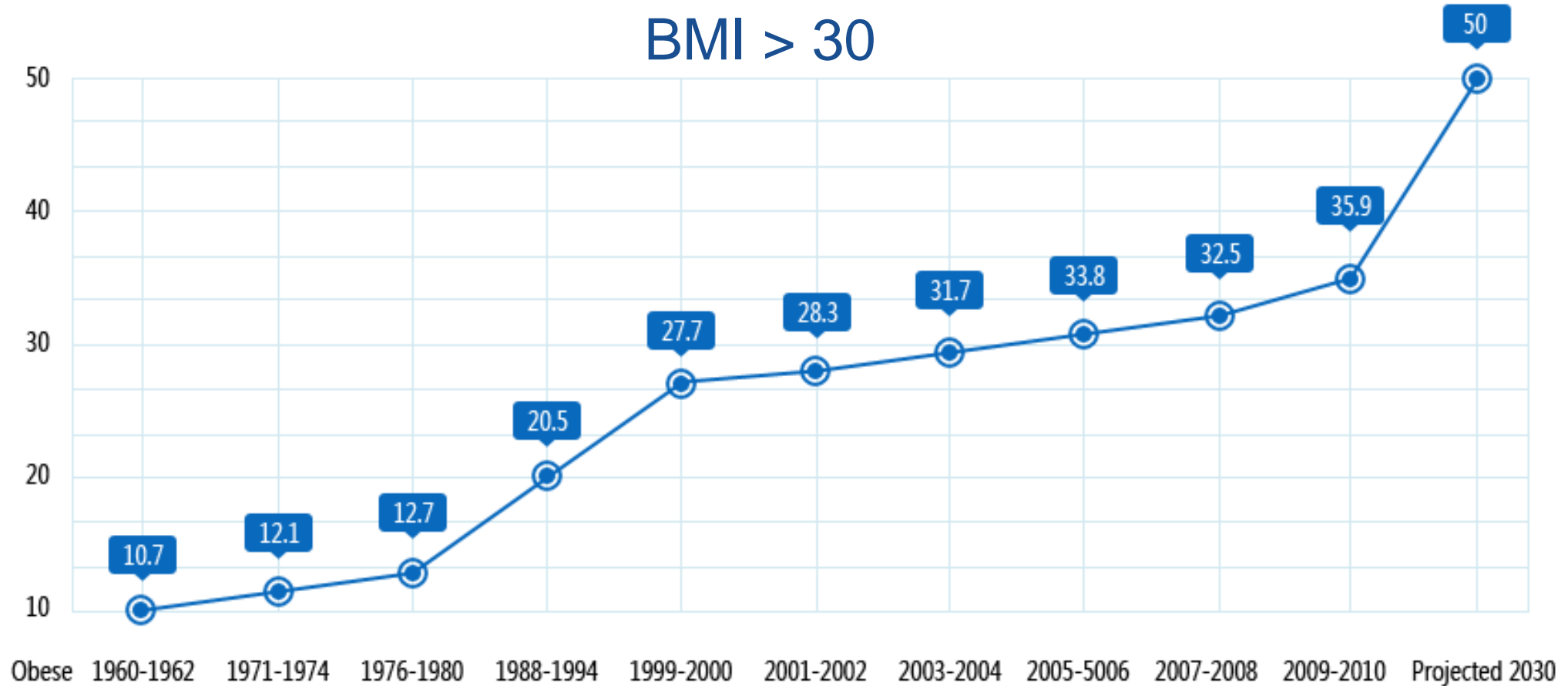
Morbidly obese

*WHO

Waist Circumference

	Male	Female
Risk	37" (94 cm).	31,5" (80 cm)
High Risk	40" (102 cm).	34,5" (88 cm)

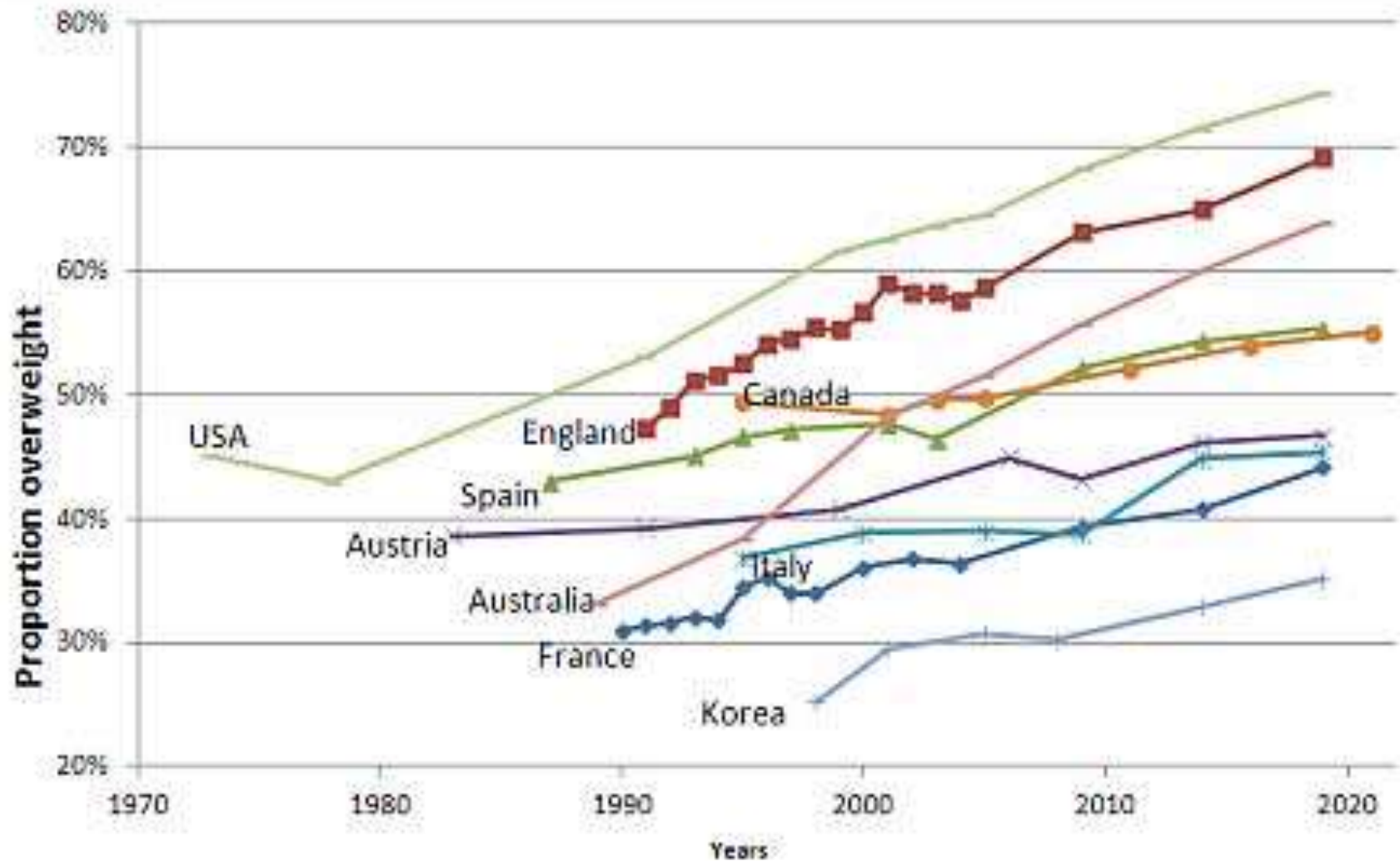
Prevalence of Obesity Among U.S Adults Aged 20-74



Derived from NHANES data (http://www.cdc.gov/nchs/data/hestat/obesity_adult_09_10/obesity_adult_09_10.html#table1)

Overweight BMI>25

Past and projected future overweight rates in selected OECD countries

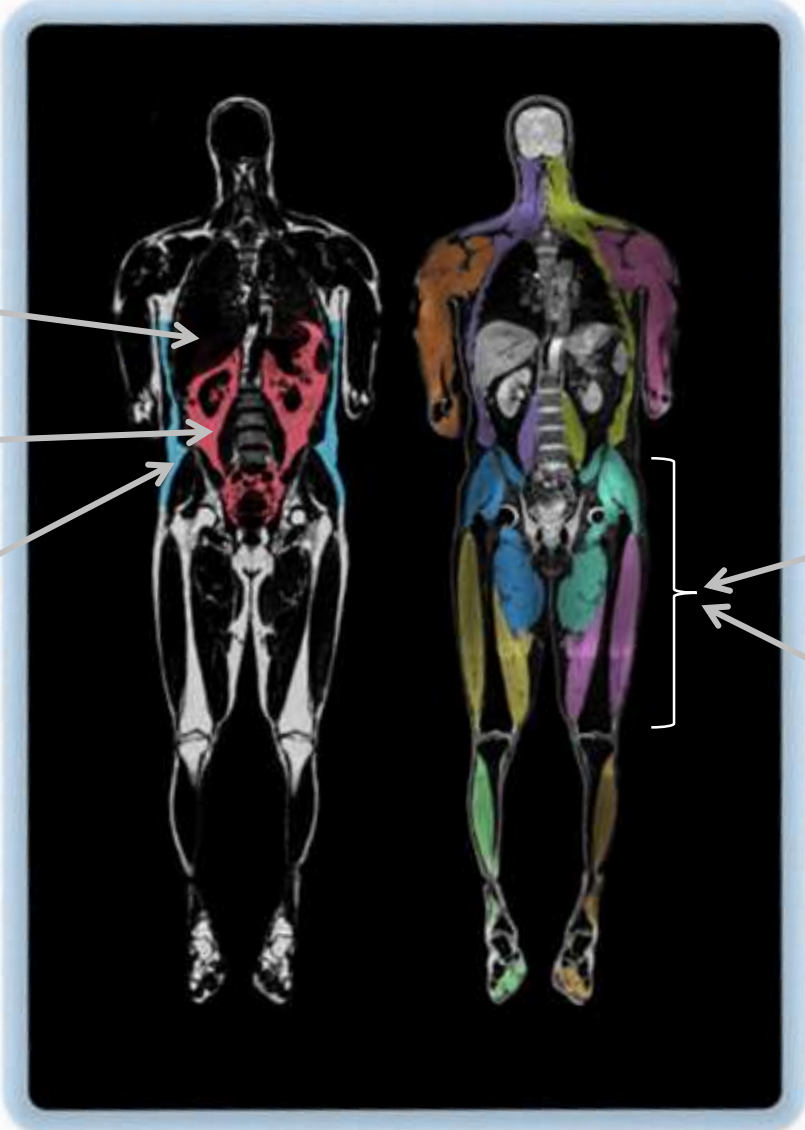


Body Composition Profiling in UKBB

Liver fat (%)

Visceral Fat (volume)

Abdominal Subcutaneous Fat (volume)



Rapid
6-Minute
MRI

Lean Thigh Muscle (volume)

Muscle Fat Infiltration (%)

BCP – Body Composition Profile

Muscle Fat Infiltration

Sarcopenia and Muscle Degeneration
Predictor of CV Events¹⁵
Predictor of High Mortality¹⁵



Lean Muscle Tissue

Sarcopenia and Cachexia
Predictor in Most End-Stage Diseases¹⁶



Liver Fat

Insulin Resistance^{10,11,12}
Predictor of CV Events^{13,14}
Transition into NASH



Total Abdominal Fat Index

Highly correlated to BMI
Fat-tissue Specific



Visceral Fat

Insulin Resistance^{1,2,3}
Predictor of CV Events^{4,5,6}
Adverse Outcomes in Several Diseases^{7,8,9}

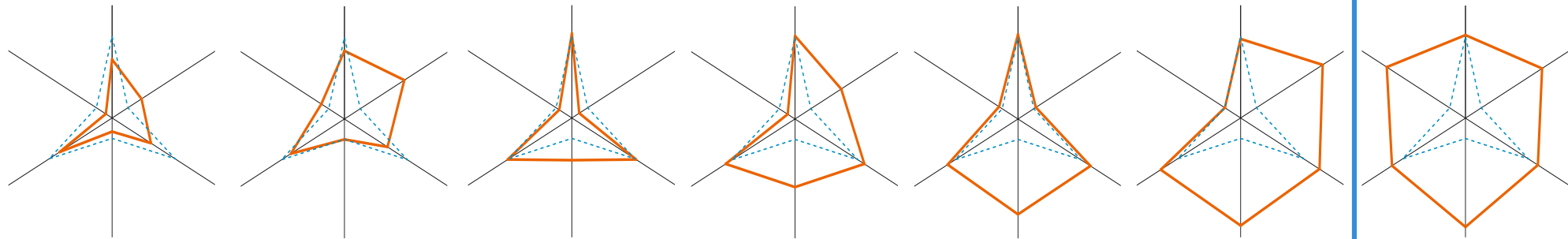
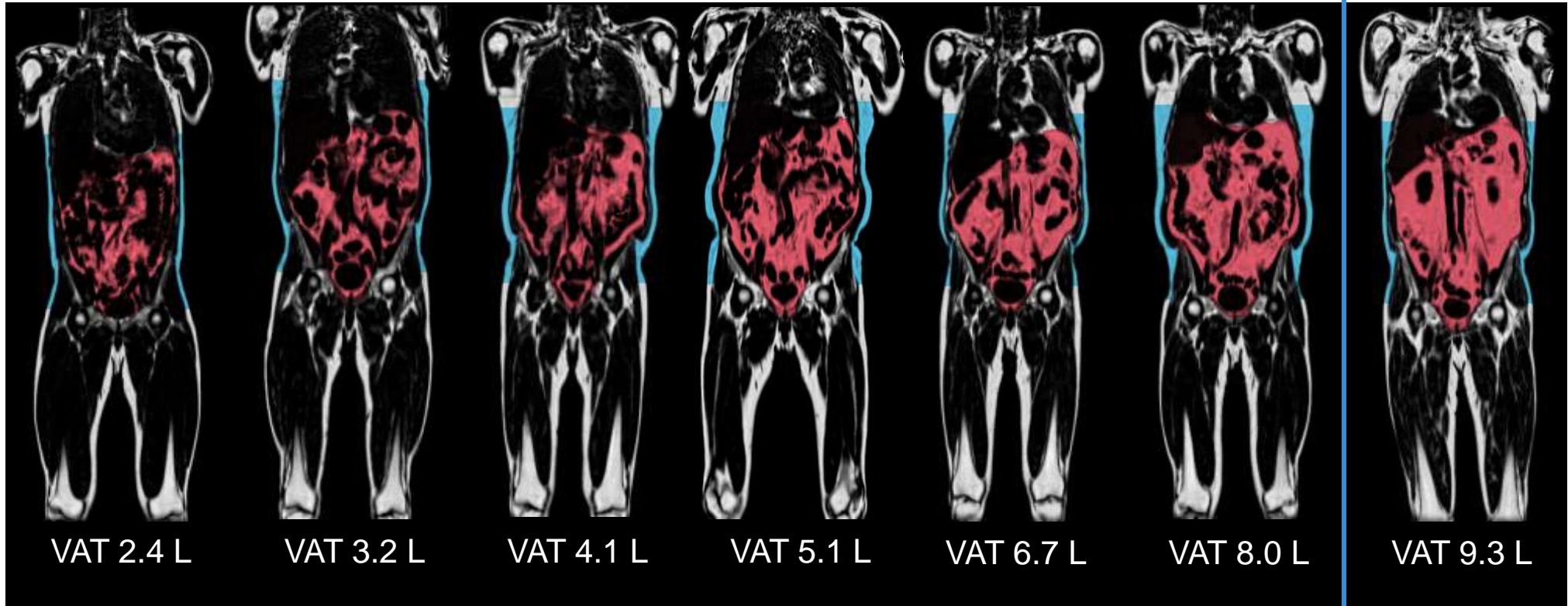


Fat Ratio

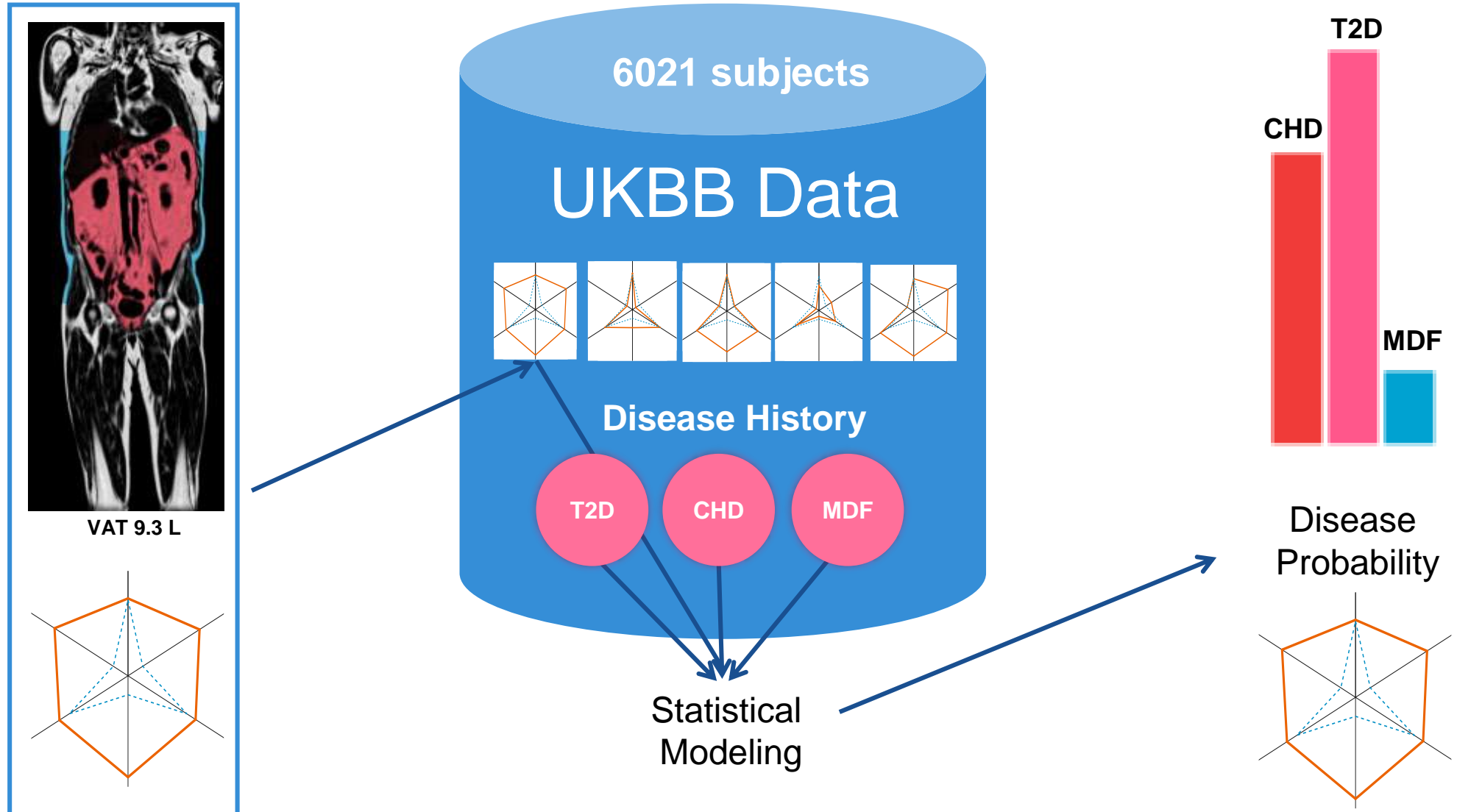
Metabolic disease free
population
as reference star

--- Healthy Population Mean
(extracted from AMRA reference database)

7 UKBB participants: Identical BMI = 27 (+/-0,5) & Waist circumference = 91 cm

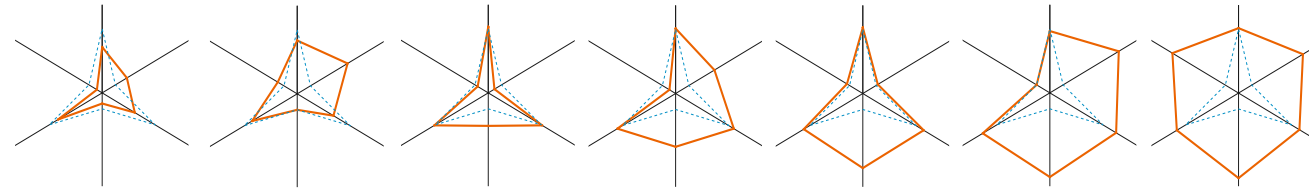
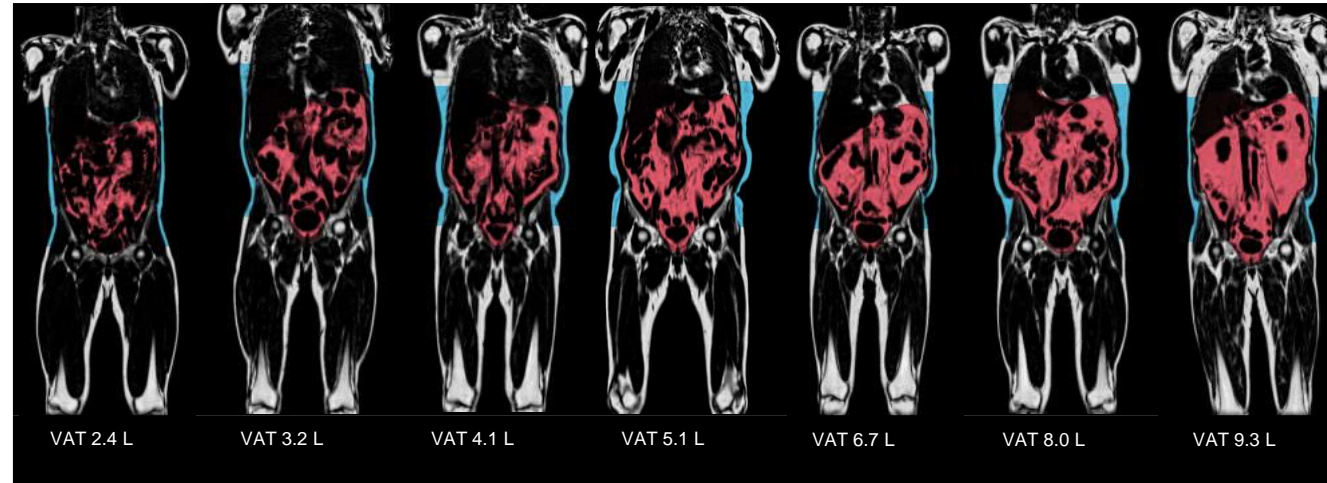


Methods Description

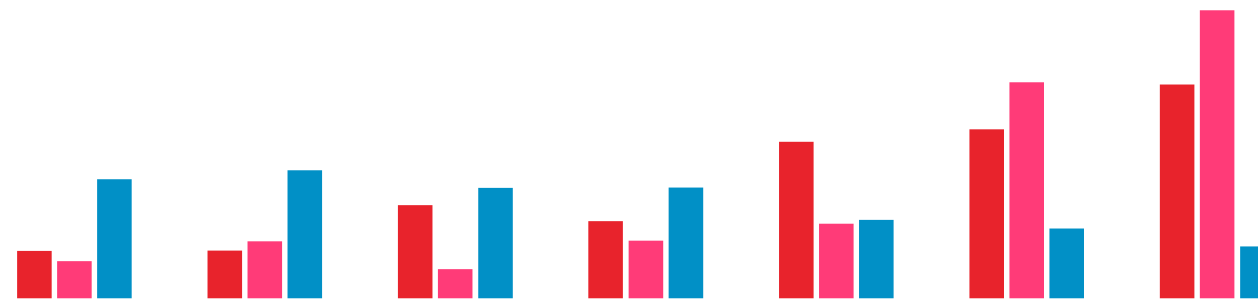


7 UK Biobankers: Identical BMI = 27 (+/-0,5) & Waist circumference = 91 cm

Vastly different with direct body composition biomarkers



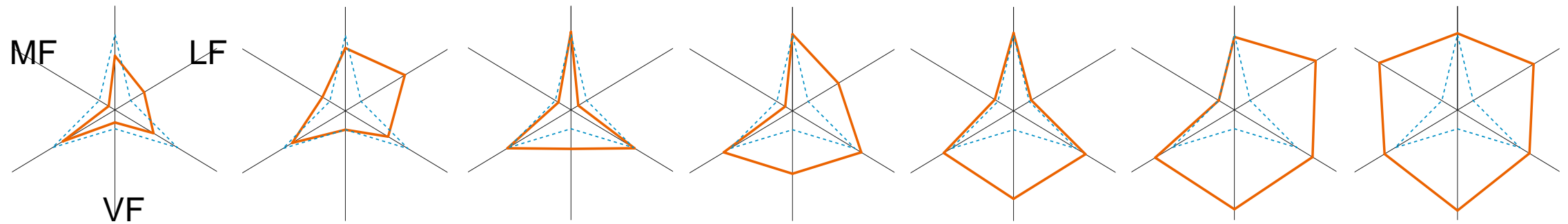
Individualized disease association profiles



Sex-and-age normalized disease predicted probability

■ Coronary Heart Disease ■ Type 2 Diabetes ■ Metabolic Disease Free

7 UK Biobankers: Identical BMI = 27 (+/-0,5) & Waist circumference = 91 cm



Fat Distribution Matters!



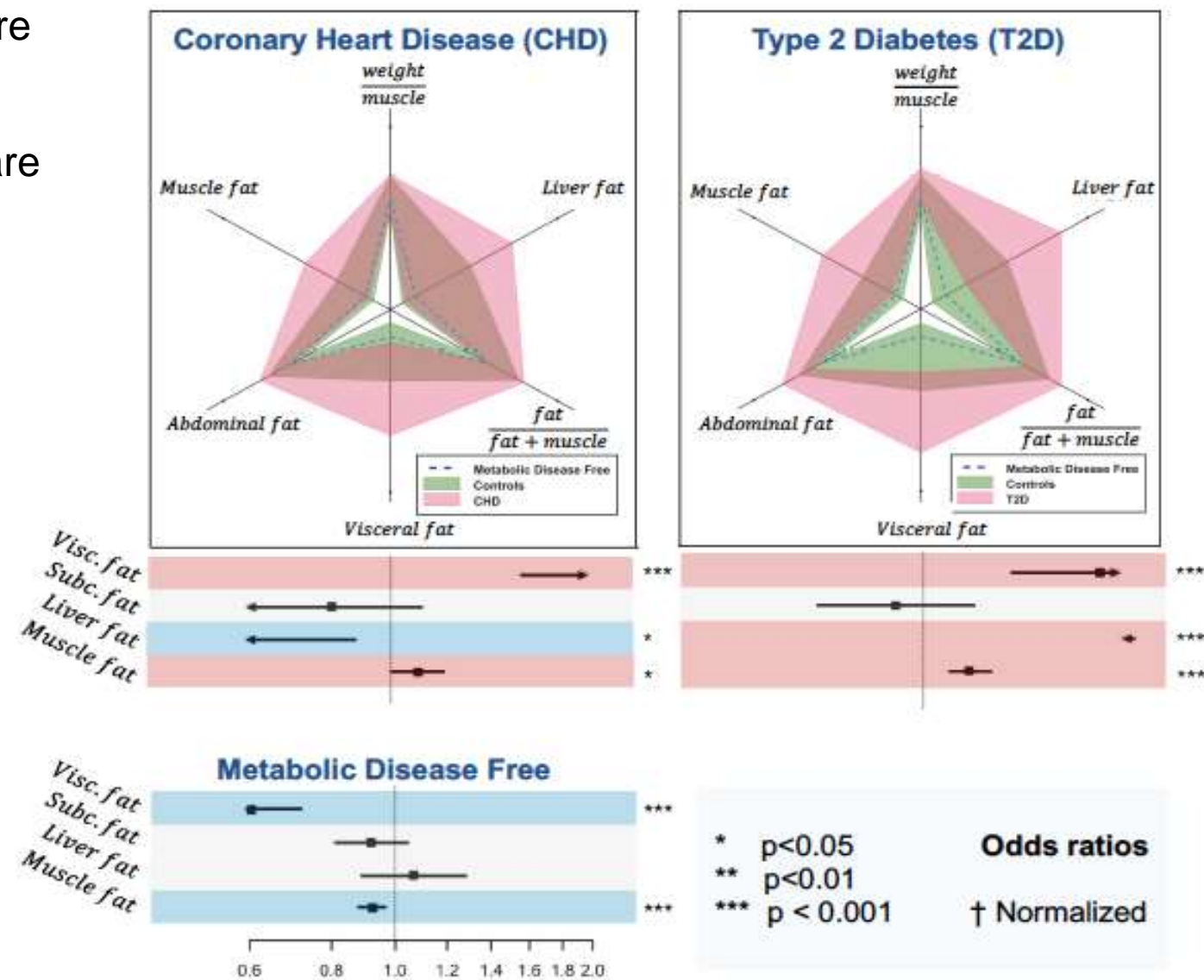
■ Coronary Heart Disease

■ Type 2 Diabetes

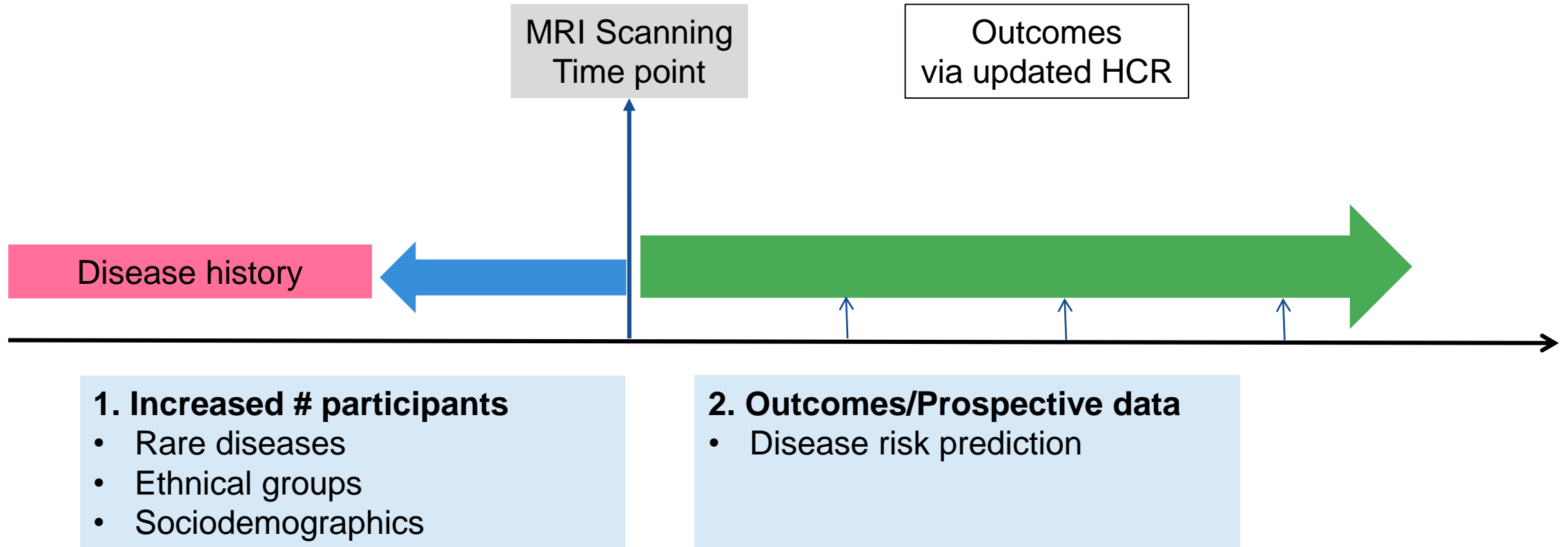
■ Metabolic Disease Free

Summary: Clinical Associations

- **Low Visceral fat** and **Muscle fat** infiltration are associated with metabolic health
- **High Visceral fat** and **Muscle fat** infiltration are associated with CHD and T2D
- Associations with **Liver fat** ambiguous:
 - Positive with T2D
 - Negative with CHD
 - Non-significant with metabolic health
- Associations could not be described by
 - Sex
 - Age
 - Lifestyle
 - BMI
 - Single fat compartment alone



Next Step



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Redefining Obesity, From BMI to BCP

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