

# Finding a clinically relevant measure of obesity

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Course: Solving biological  
problems that require math  
Prof. Sven Bergmann

Spring 2022

# Clinical risks associated with obesity



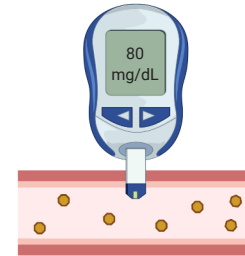
High blood pressure



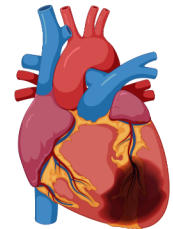
Stroke



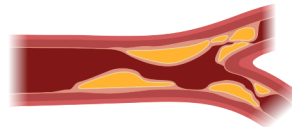
Diabetes



Infarction



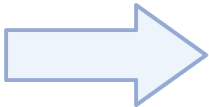
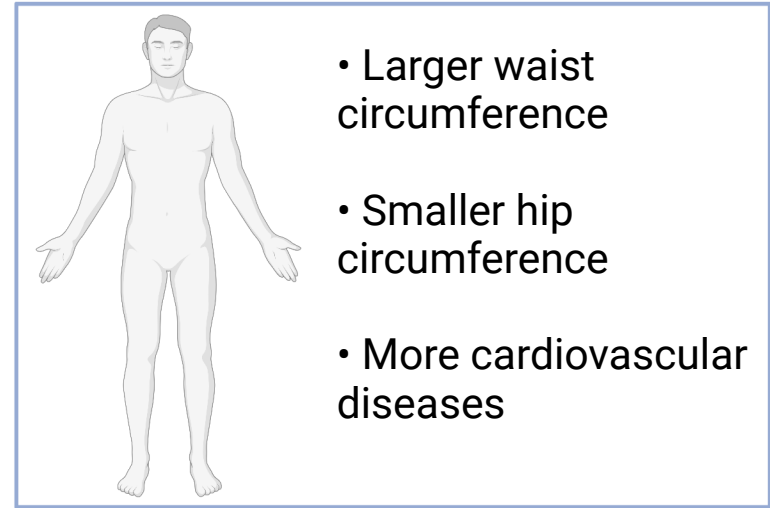
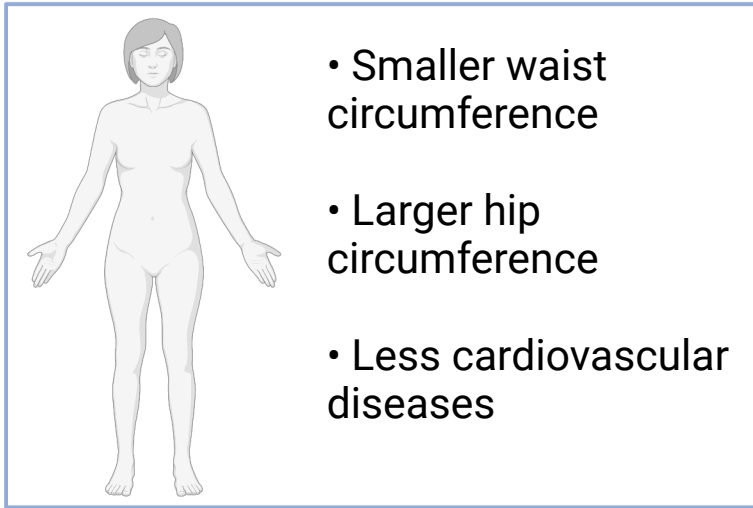
High cholesterol



# How to measure obesity?

<u>Measure</u>	<u>Limitations</u>
BMI = weight / height <sup>2</sup>	Underestimation in short individuals Overestimation in tall individuals
BMI <sub>x</sub> = weight / height <sup>x</sup>	Unspecific towards tissue type and distribution
WHR = waist circumference / hip circumference	Adipose tissue type (visceral vs. subcutaneous)
Bioimpedence, abdominal scan, ...	Materials availability, cost

# Sexual dimorphism

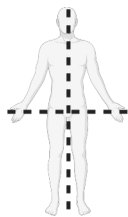


Is body fat distribution related to cardiovascular disease risk?

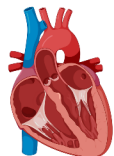
# The project



UK Biobank (n ~ 500,000)



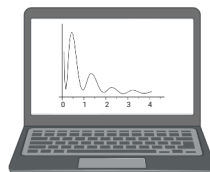
Height  
Weight  
Waist circumference  
Hip circumference



Systolic blood pressure (SBP)



Age  
Sex



- Data exploration using descriptive statistics
- Combinations of the 4 body measurements into indices
- Selection of index that best explains SBP using linear regression and model comparison
- Stratified analysis (by sex and age)



- Share results with Sofia's group (BMI and GWAS)
- Possible phenotype candidates for GWAS will be tested by Sofia's group

# Objectives

## Question 1

How do body measurements correlate with each other, with age and with sex?

## Question 2

What combination of body measurements (index) is most strongly associated with SBP?

## Question 3

Does the association with SBP depend on sex and age? If so, stratify the analysis

## Optional question

What is the genetic heritability of relevant body measurement indices?