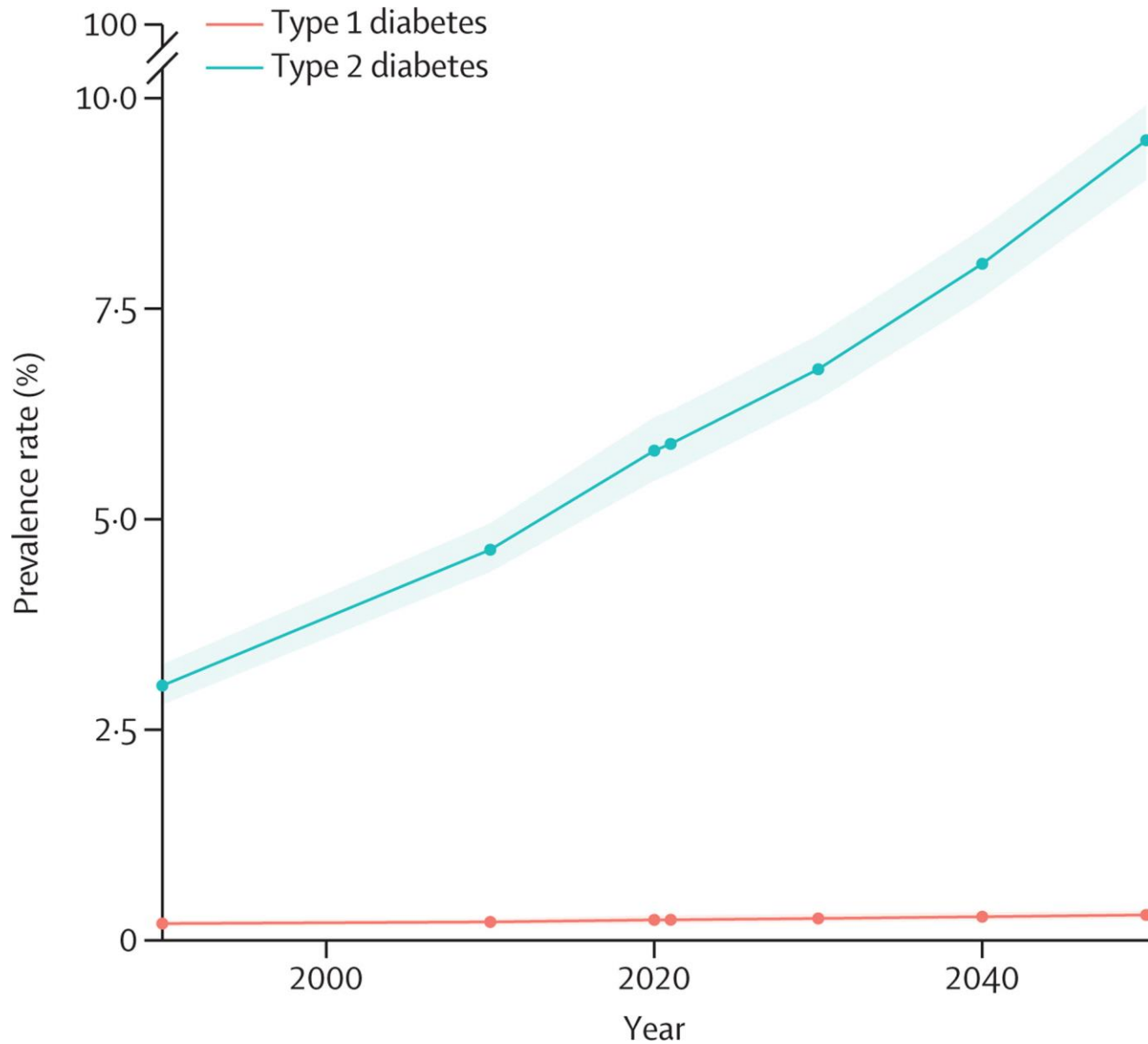


Metabolic Syndrome Demystified

Alex Wilber, PhD IFMCP

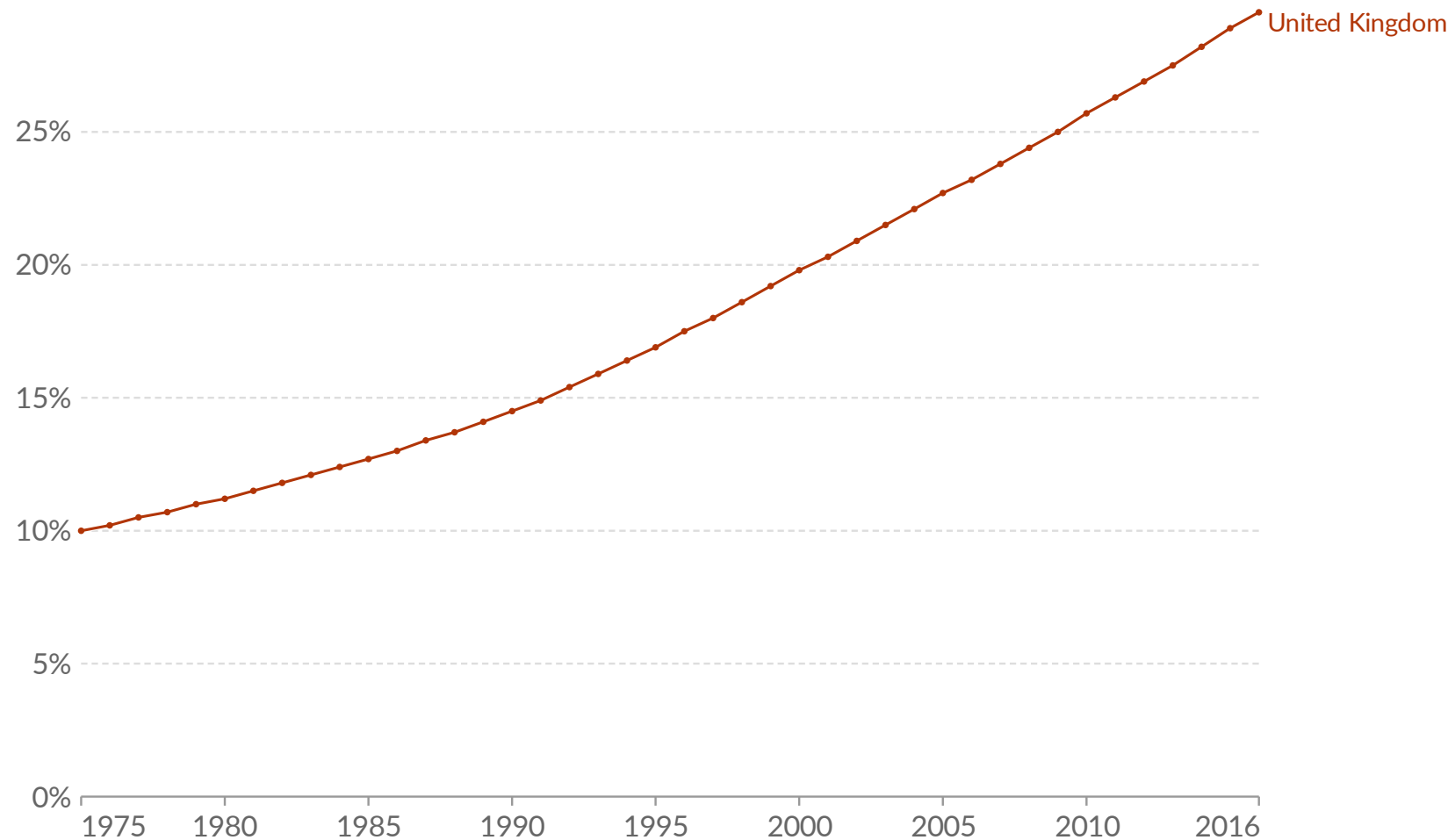


Global age-standardised prevalence of type 1 and type 2 diabetes from 1990 through 2050 forecasts

Ong, Kanyin Liane et al "Global, regional, and national burden of diabetes from 1990 to 2021, with projections of prevalence to 2050: a systematic analysis for the Global Burden of Disease Study 2021". Lancet, Volume 402, Issue 10397, 203 - 234

Share of adults that are obese, 1975 to 2016

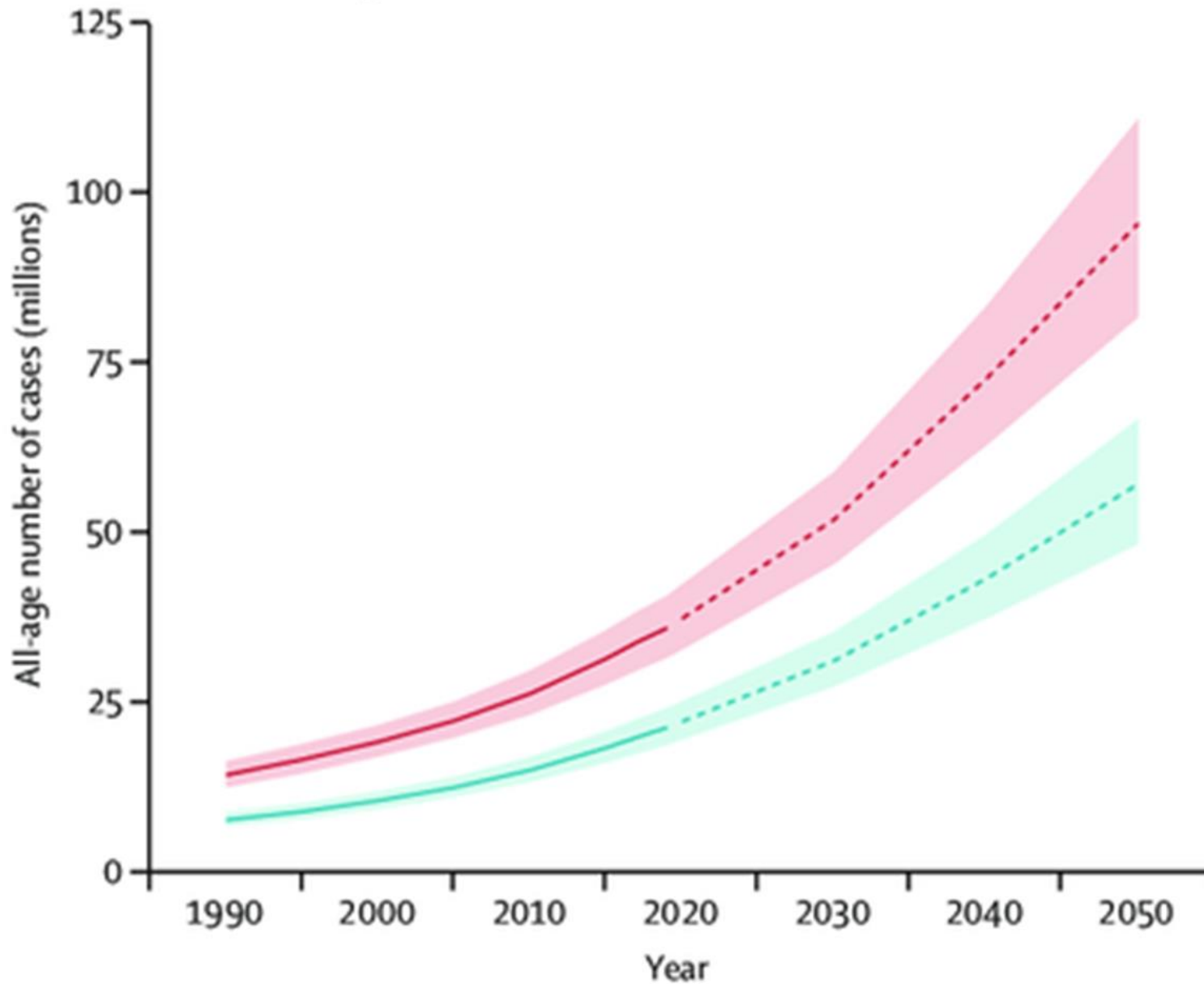
Obesity is defined as having a body-mass index (BMI) equal to, or greater than, 30. BMI is a person's weight (in kilograms) divided by their height (in meters) squared.



Source: WHO, Global Health Observatory

OurWorldInData.org/obesity • CC BY

All-age number of individuals with dementia



Ghith, Nermin. (2022). Estimation of the global prevalence of dementia in 2019 and forecasted prevalence in 2050: an analysis for the Global Burden of Disease Study 2019. *The Lancet*. 7. e105-e125.

Exhibit 5: Top 25 diagnoses ranked by average aggregate annual expenditure

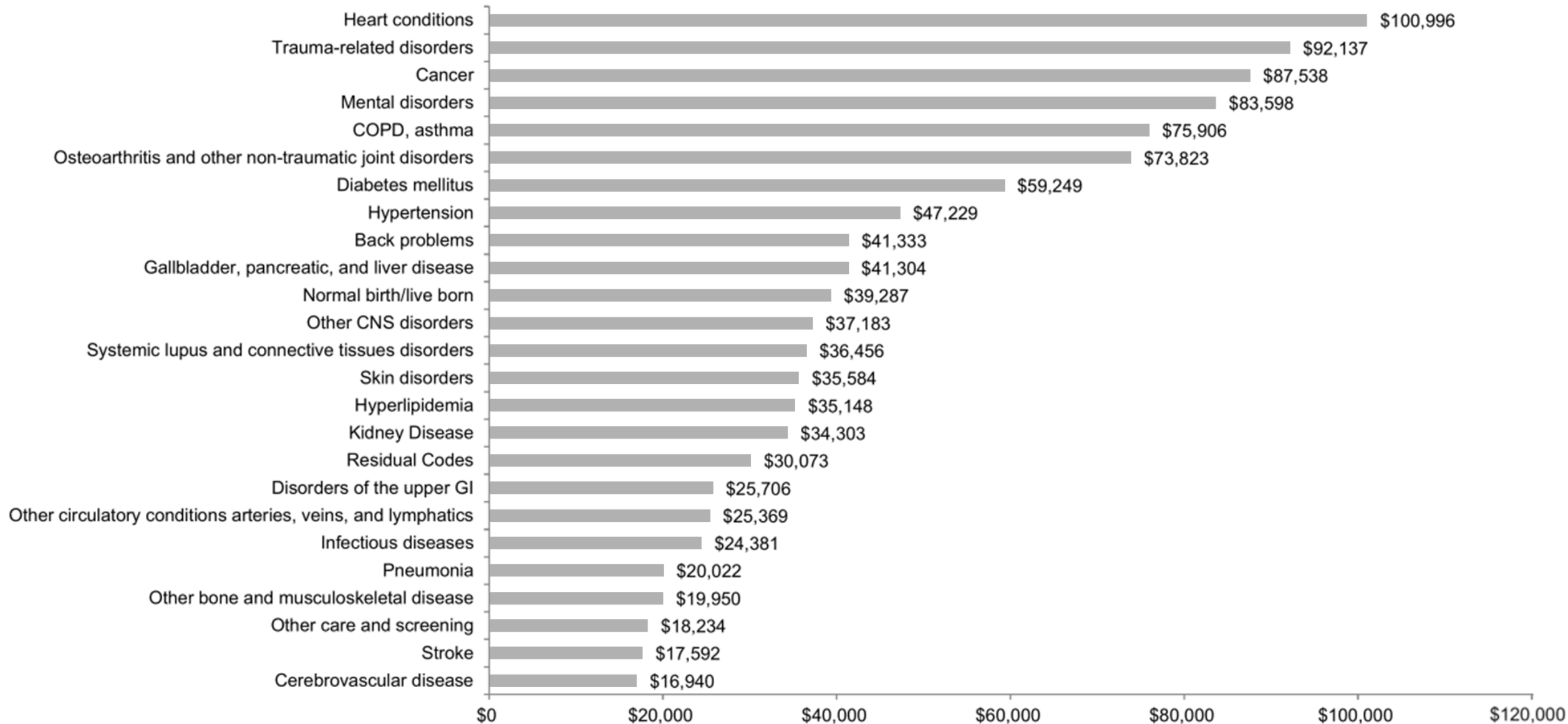


Exhibit 5: Top 25 diagnoses ranked by average aggregate annual expenditure

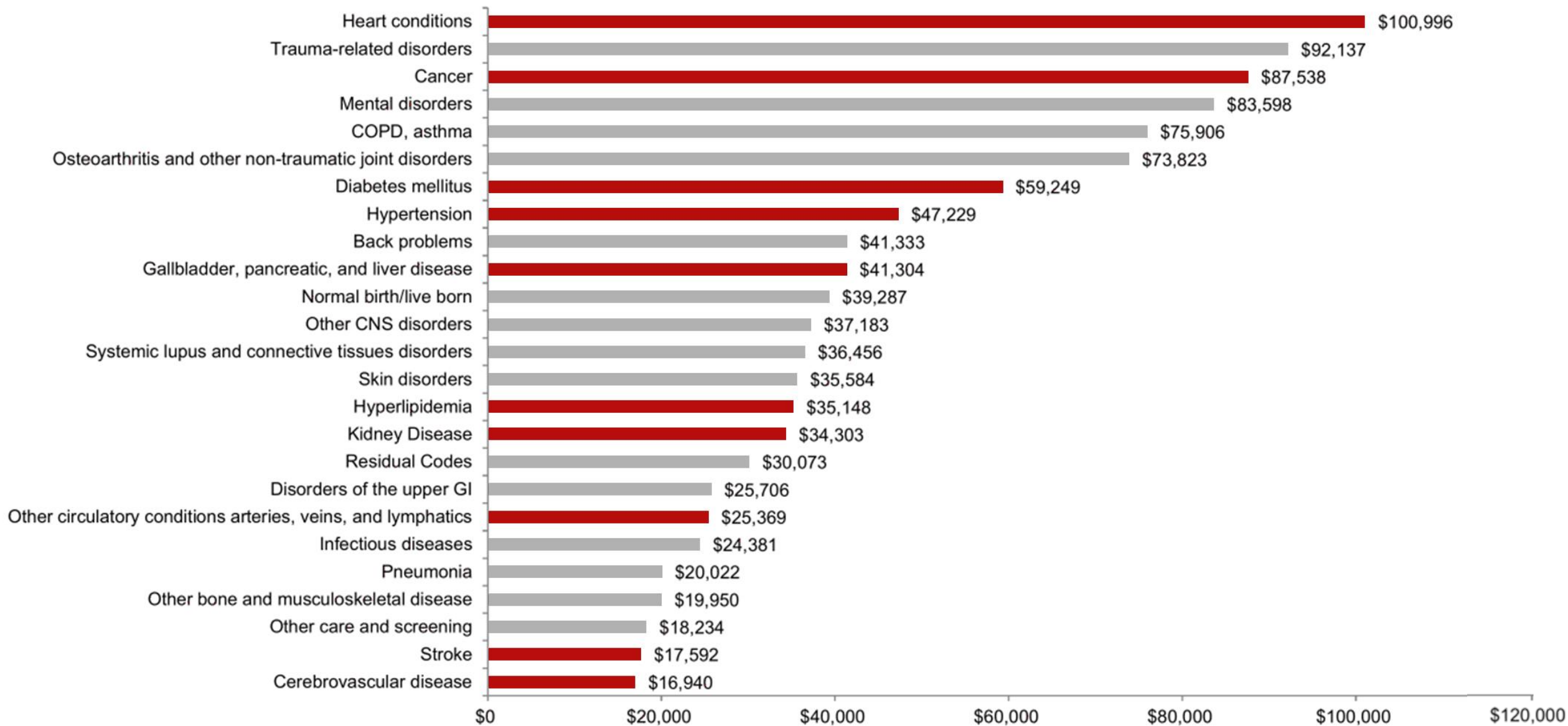
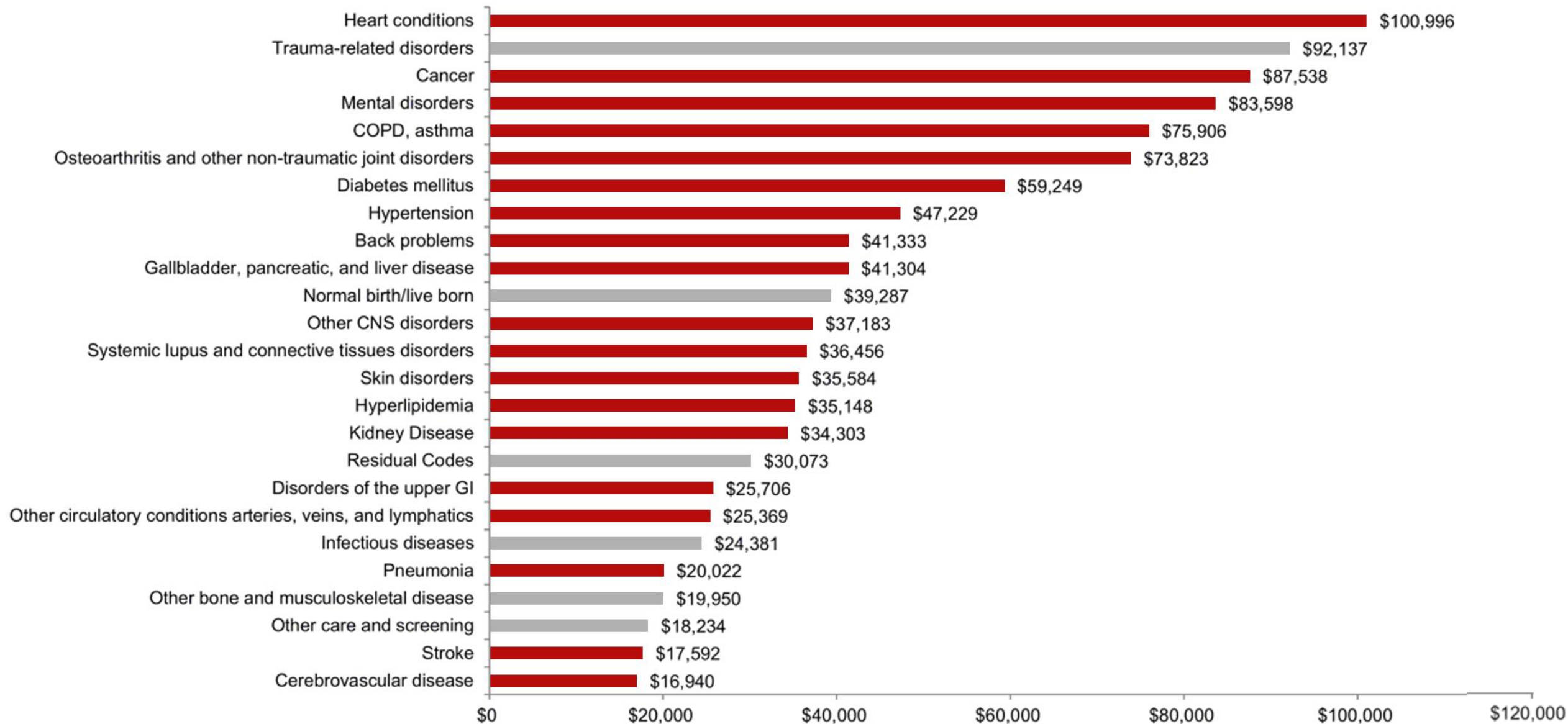


Exhibit 5: Top 25 diagnoses ranked by average aggregate annual expenditure



Metabolic syndrome – 5 hallmarks

High waist circumference

Population- and country-specific cut-offs

High triglycerides

≥ 150 mg/dL, or relevant drug treatment

Low HDL cholesterol

< 40 mg/dl in males, < 50 mg/dL in females, or relevant drug treatment

High blood pressure

Systolic ≥ 130 mmHg and/or diastolic ≥ 85 mmHg, or antihypertensive treatment and a history of hypertension

High fasting glucose

≥ 100 mg/dL, or relevant drug treatment

a proxy for
insulin resistance

Prevalence

- In the US:
 - In 2018: **41.8%** of adults
 - Up from 37.6% in 2012
 - 64.7% of adults had elevated fasting glucose
 - **Over 50%** of over-60s had metabolic syndrome

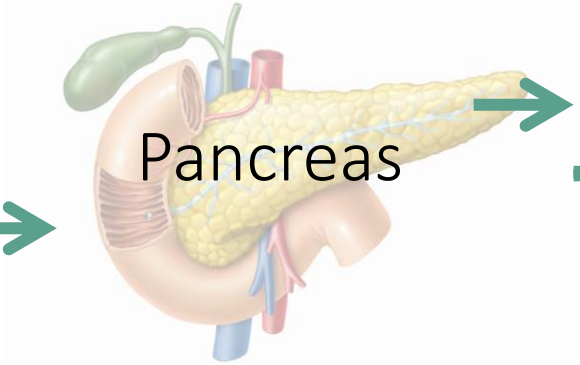
- In the UK:
 - Much less data, estimated at **25% of adults**

Xiaopeng Liang et al., Prevalence of metabolic syndrome in the United States National Health and Nutrition Examination Survey 2011–18, *Postgraduate Medical Journal*, Volume 99, Issue 1175, September 2023, Pages 985–992

Angelo Scuteri et al., Metabolic syndrome across Europe: Different clusters of risk factors, *European Journal of Preventive Cardiology*, Volume 22, Issue 4, 1 April 2015, Pages 486–491

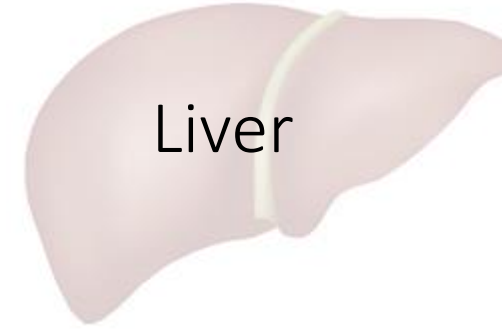
What is insulin resistance?

High blood
glucose →



Pancreas

→ Insulin

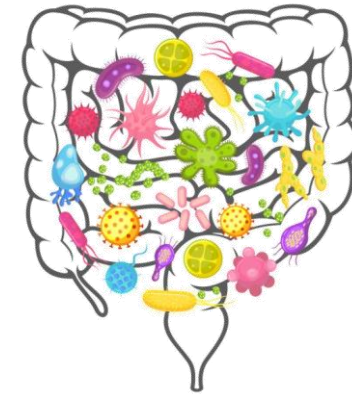


Liver

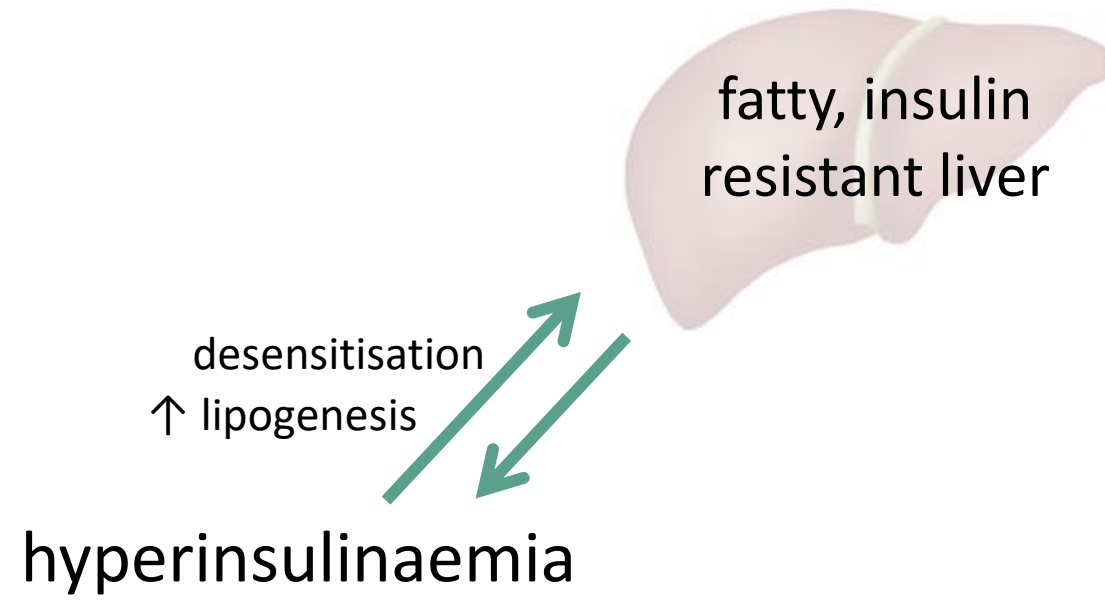
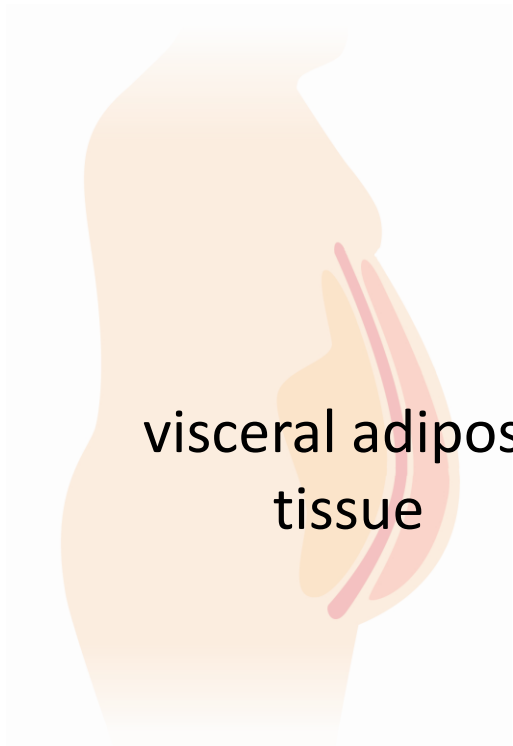


Muscle

Why is this happening?

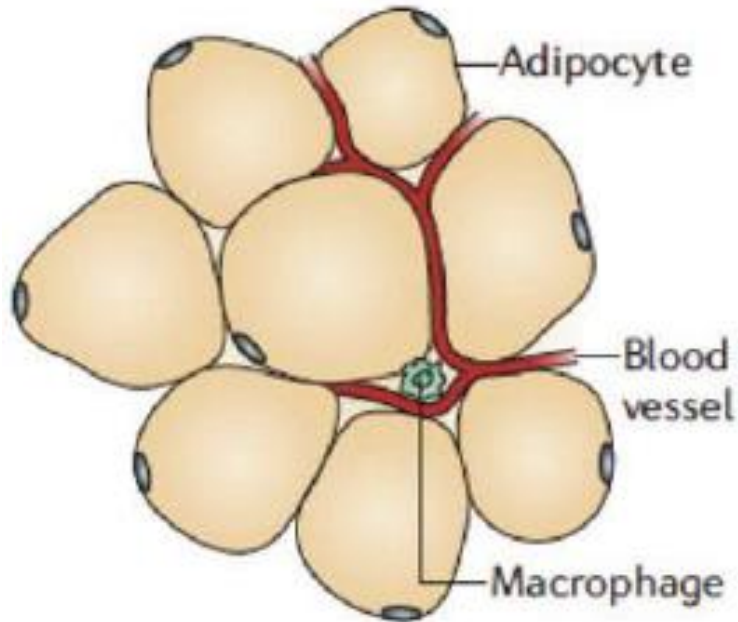


Mechanisms



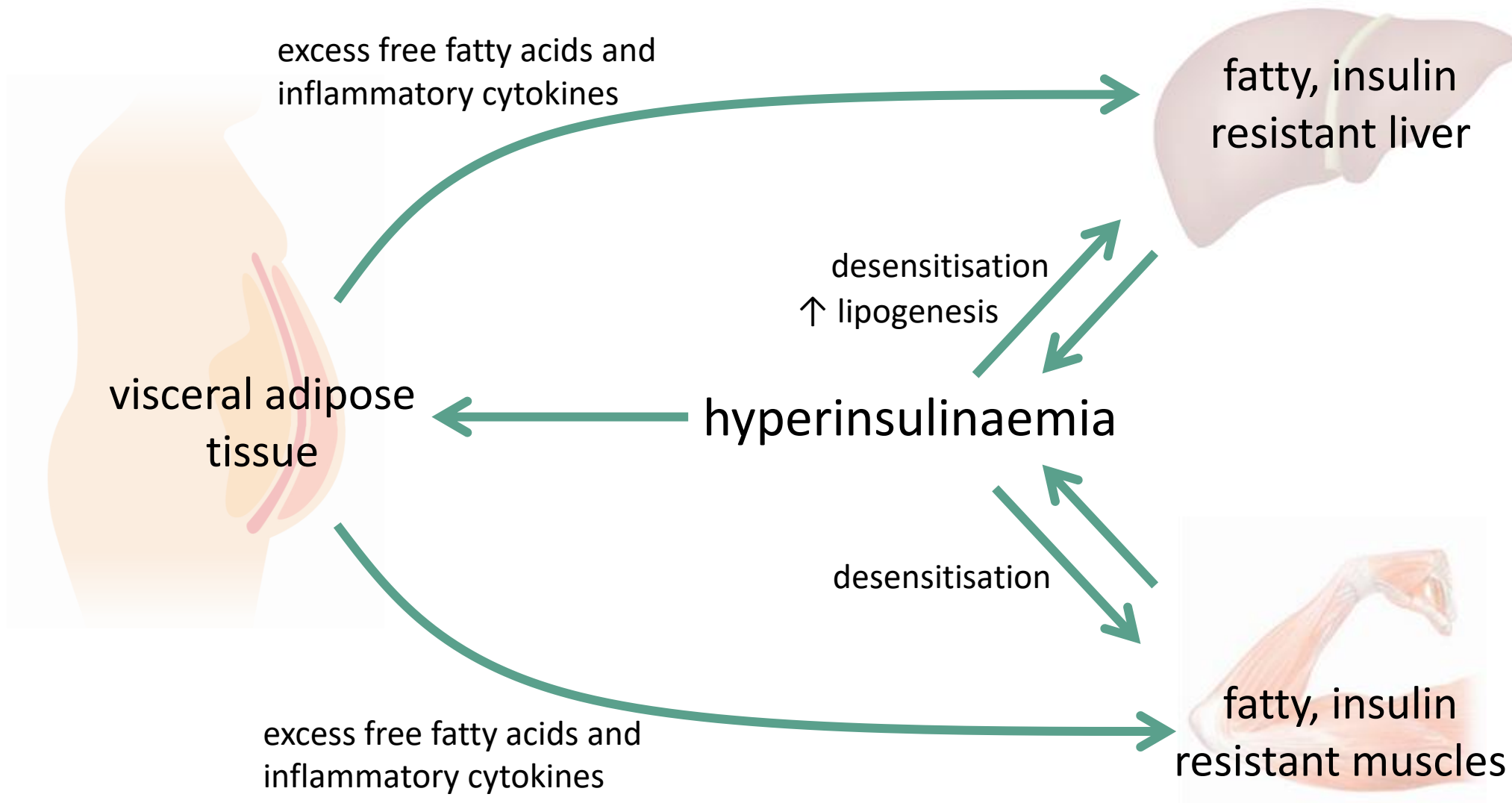
Visceral adipose tissue

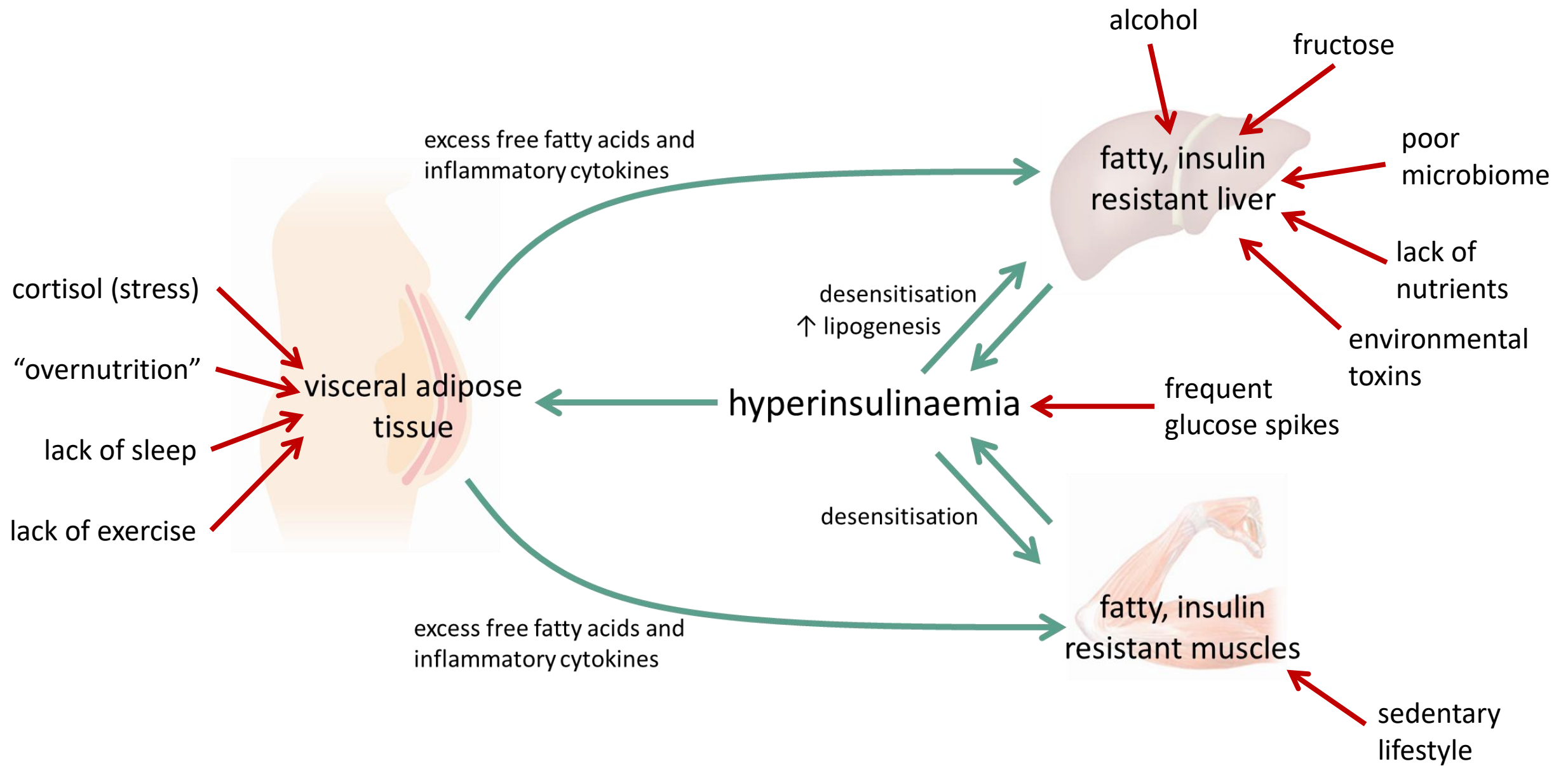
Lean adipose tissue



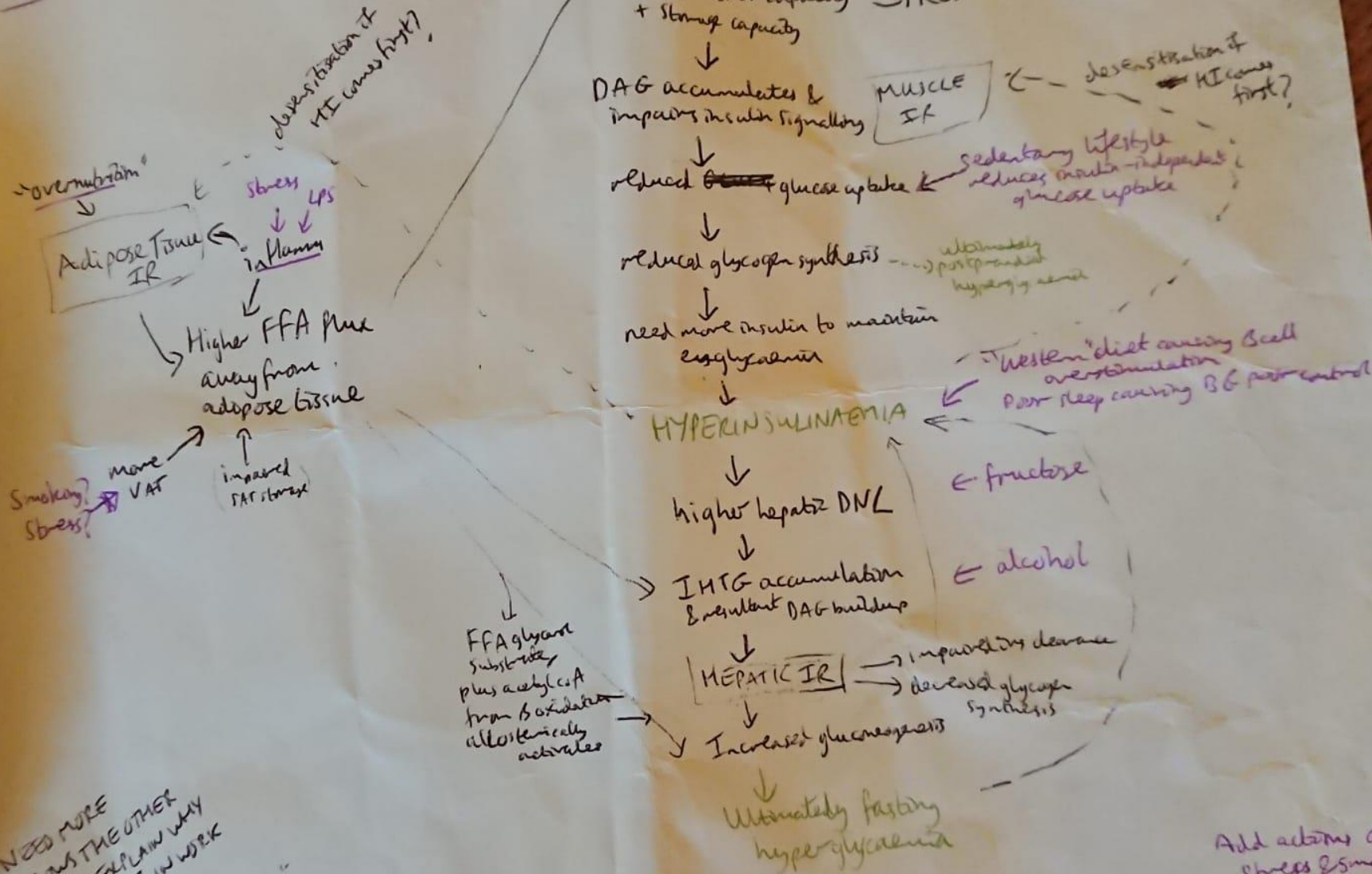
- Inadequate oxygen supply
- Frequent cell death
- Macrophage recruitment (up to 50%!)
- Release of pro-inflammatory cytokines and free fatty acids

Ferrazzi, Enrico & Stampalija, Tamara & Aupont, Jean Edgard. (2013). The evidence for lateonset preeclampsia as a maternogenic disease of pregnancy. *Fetal and Maternal Medicine Review*. 24. 10.1017/S0965539513000028.





SIMPLIFIED



NEED MORE
ARROWS THE OTHER
WAY TO EXPLAIN WHY
ALL ROUTES IN WORK

↓ I guess
"inflammation"

Add actions of
stress & smoking
or cortisol
Acknowledge
Inflamm +
metox + org...

But why does all
this matter?

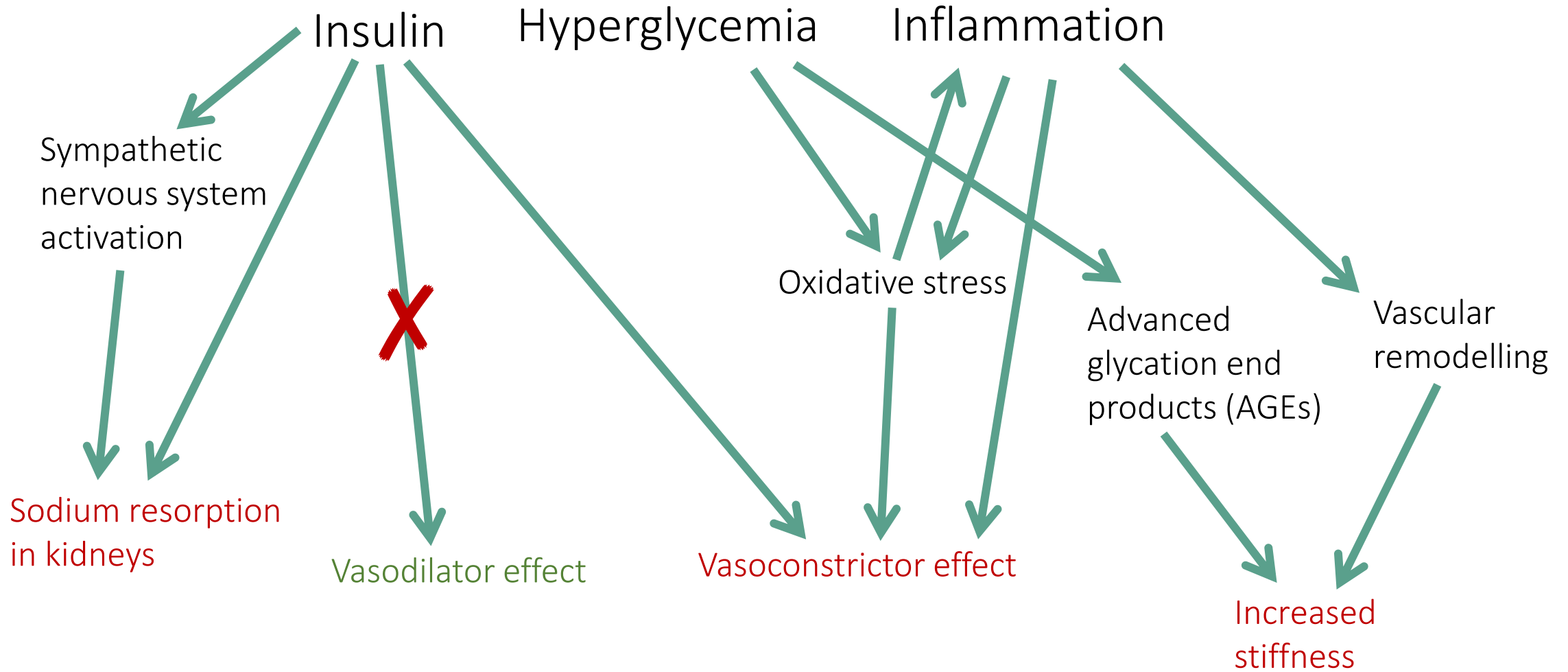
Direct consequences
for the body

Hyperinsulinemia

Inflammation

Hyperglycemia

Example consequences - hypertension



Metabolic syndrome – 5 hallmarks

Connection to other conditions

Some cancers

Atherosclerosis

Mood disorders

Chronic inflammatory skin diseases

Autoimmune diseases (100+)

PCOS

Chronic kidney disease

Diabetes

Heart failure

Osteoarthritis

Gallstones

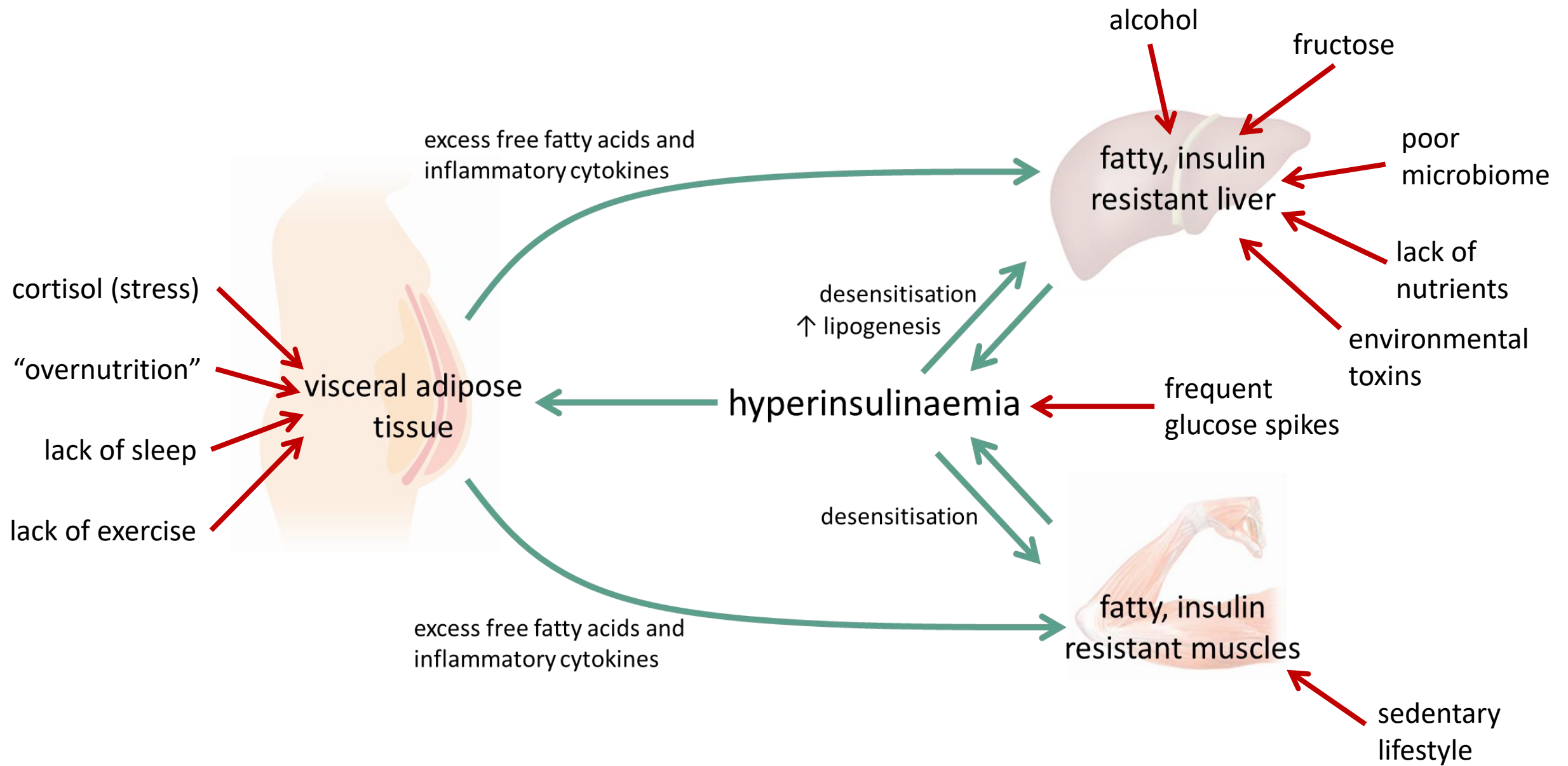
Gout

Dementia

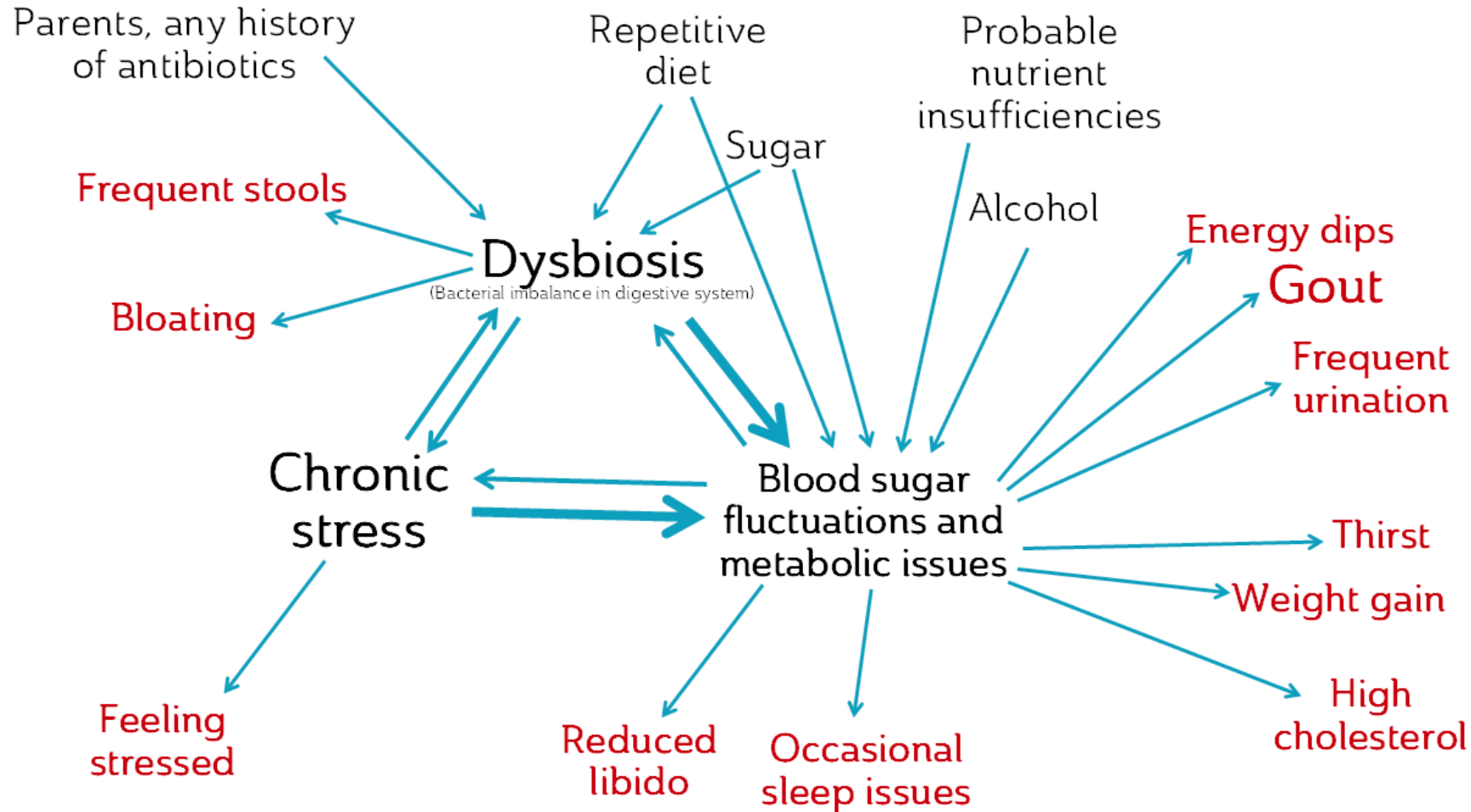
Many more...

So what can we do about it?

Multifactorial → multifixorial



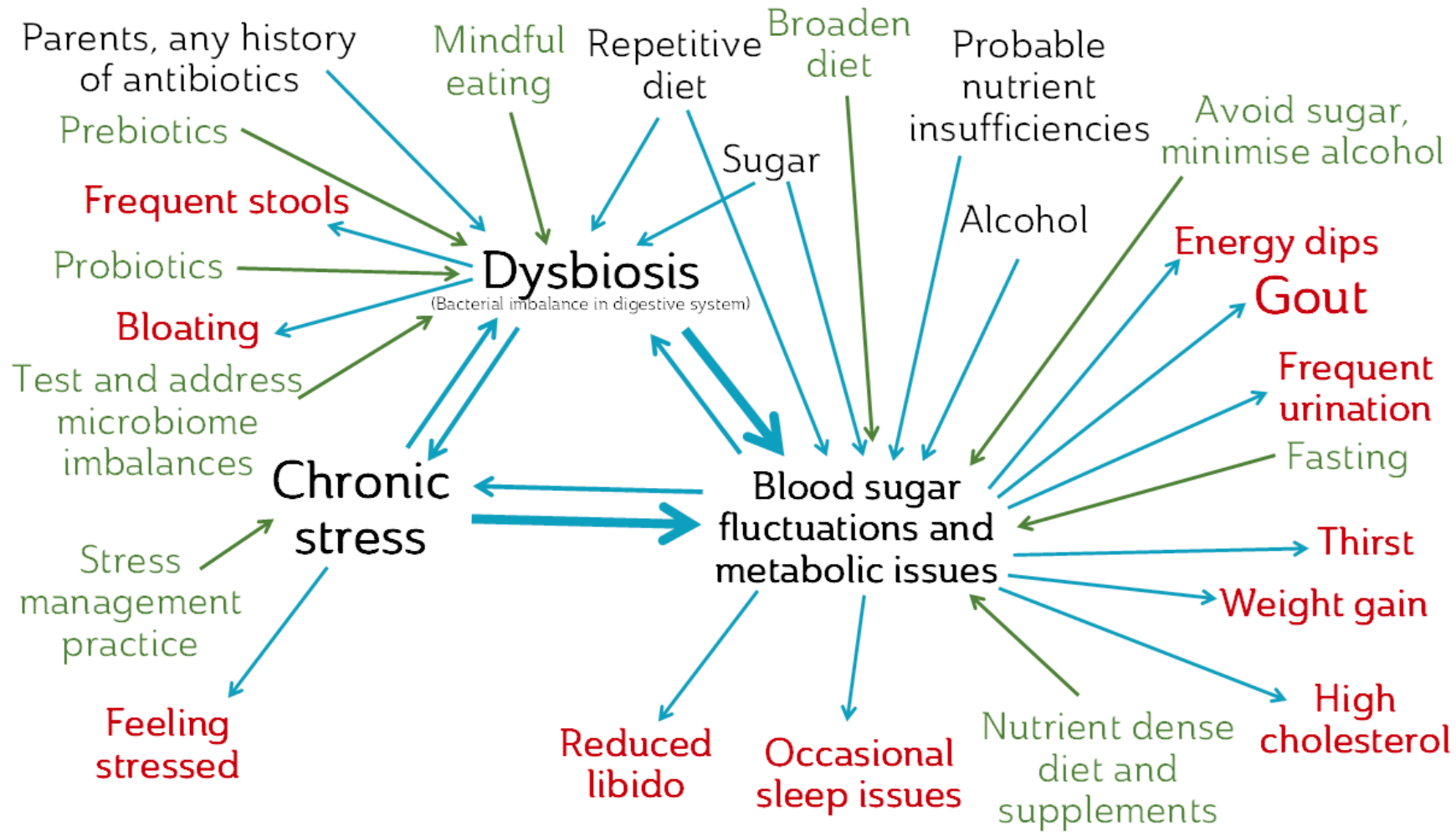
Case study - Peter



Interventions

- Avoid sugar, minimise alcohol
- Diverse, nutrient dense diet
- Mindful eating
- Pre- and probiotics
- Breathing exercises for stress management

Case study - Peter



Thank you