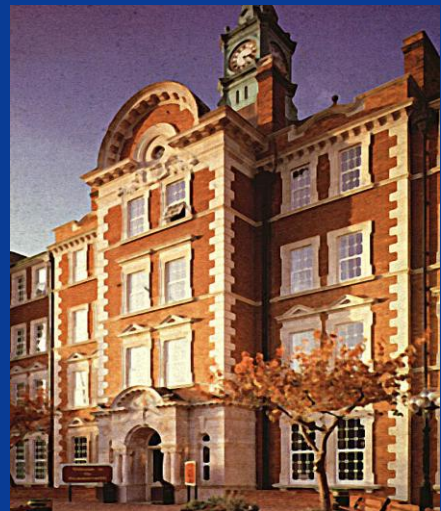


CARDIOVASCULAR EFFECTS OF DIABETES



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Essentials
of Operative
Cardiac Surgery

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How insulin maintains glucose homeostasis in the fed and fasting states

How hyperglycemia drives vascular injury, heart disease, stroke, and heart failure

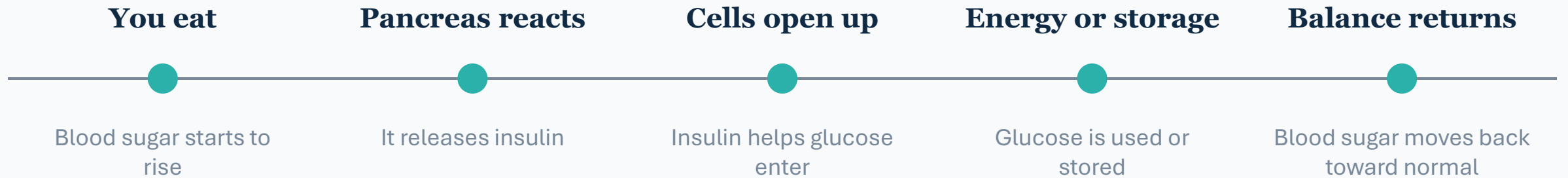
The big picture

- Food is broken down into glucose
- Insulin helps glucose move into cells
- Cells use glucose for energy
- Too little insulin leaves sugar in the blood

Energy

glucose is the body's
main quick fuel

What insulin does after a meal



With insulin vs without enough insulin

With insulin

- Sugar enters cells more easily
- Muscles can store extra fuel
- The liver slows sugar release
- Blood sugar stays in a safer range

Without enough insulin

- Sugar stays in the bloodstream
- Cells do not get enough fuel
- The liver may release more sugar
- Blood sugar remains too high

Where insulin works in the body

Liver

- Stores some sugar for later
- Stops making too much new sugar

Muscle and fat

- Take sugar out of the blood
- Use it for energy or storage

Insulin and protein metabolism

Uptake

amino acid entry
into cells rises

Synthesis

protein building is
promoted

Less breakdown

proteolysis is
reduced

What happens when insulin is deficient or ineffective

**Reduced insulin
action**



Absolute
deficiency
or
resistance
develops

**Less glucose
uptake**



Muscle
and fat
use less
circulating
glucose

**More hepatic
output**



Liver
releases
excess
glucose

Hyperglycemia



Blood
glucose
remains
elevated

**Metabolic
complications**



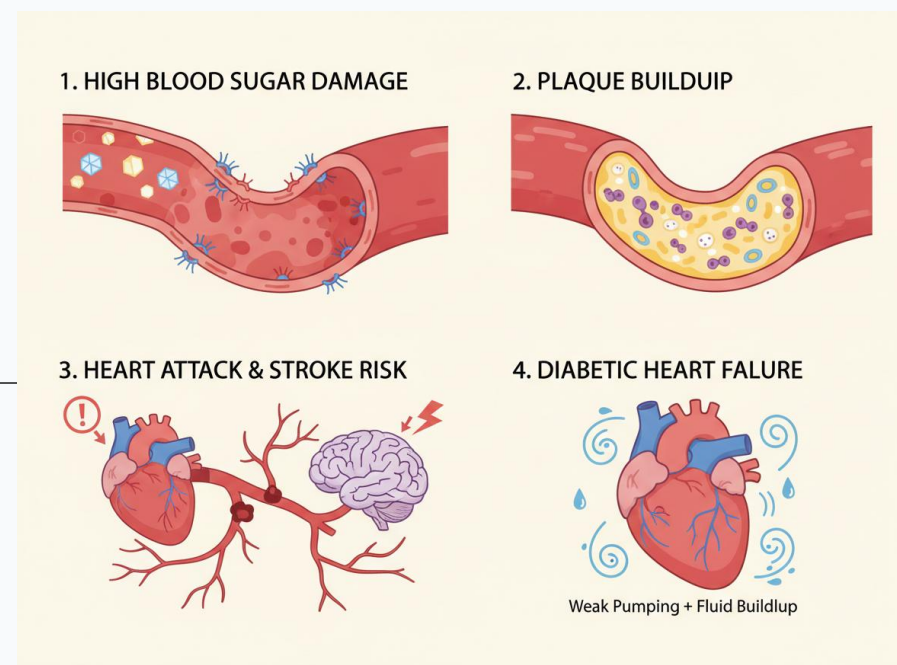
Fat and
protein
catabolis
m
increase

What diabetes means in simple terms

- The body does not make enough insulin, use it well, or both
- As a result, sugar stays too high in the blood
- High blood sugar over time can damage organs
- The heart and blood vessels are major targets

Over time

high sugar slowly wears
the body down



Too much sugar

Vessel irritation

Fatty buildup

**Narrower
arteries**

Serious problems

Extra glucose circulates
in the blood

The inner lining gets
damaged

Plaque starts to form

Blood flow becomes
harder

Heart attack, stroke, and
leg problems can follow

Blood sugar harms blood vessels

Why diabetes is hard on the heart and circulation

Blood vessel problems

- Arteries can become stiff and narrow - BP
- Clots are more likely to cause damage - STROKE
- The brain and limbs get less blood flow - STROKE

Heart problems

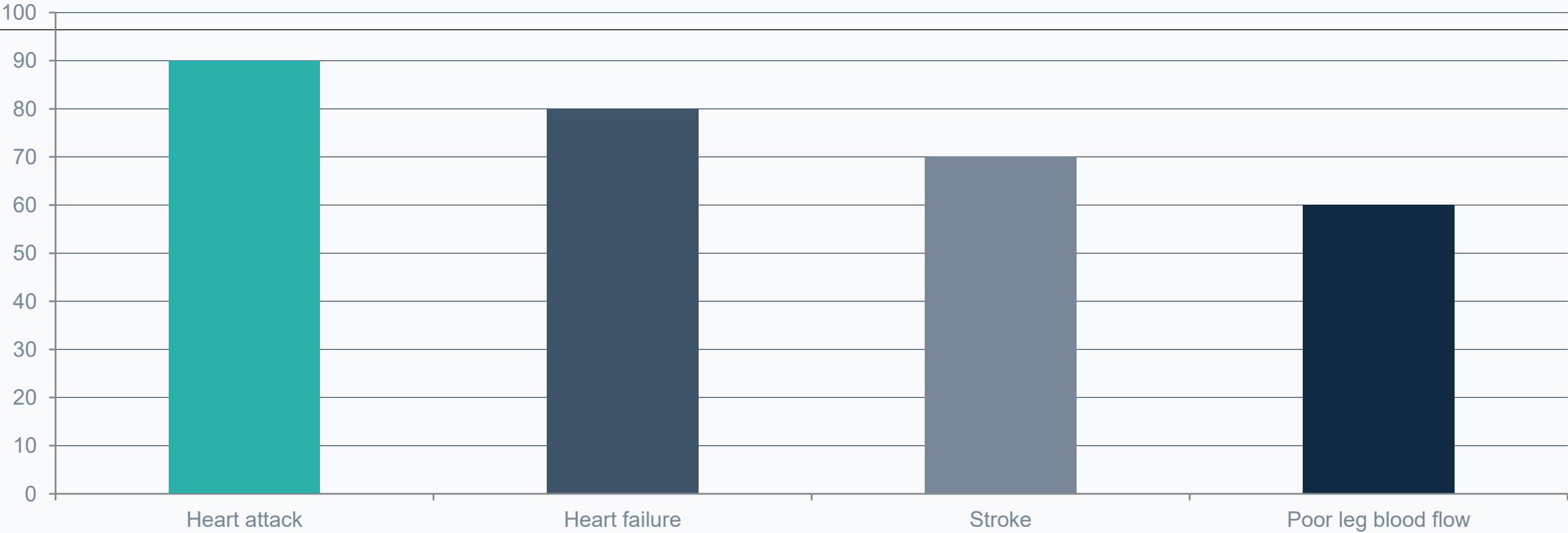
- The heart may work harder over time - MI
- Heart attacks may happen earlier - MI
- Heart failure risk becomes higher - HF

Why diabetes is a cardiovascular disease amplifier

2X-4X

higher cardiovascular
risk in many patients

Common major problems linked to diabetes



Comparison of important health risks

Warning signs and outcomes people should know

- Chest pain or pressure may signal a heart attack
- Sudden weakness or speech trouble may signal a stroke
- Shortness of breath and swelling may signal heart failure
- Foot wounds that heal poorly can become dangerous

Silent

ischemia may delay
diagnosis

Act fast

early treatment can
prevent major harm

Why outcomes are often worse

- Multimorbidity clusters with diabetes
- Kidney disease magnifies cardiovascular risk
- Autonomic neuropathy impairs heart rate control
- Delayed detection can postpone treatment

CKD

often amplifies cardio-renal risk

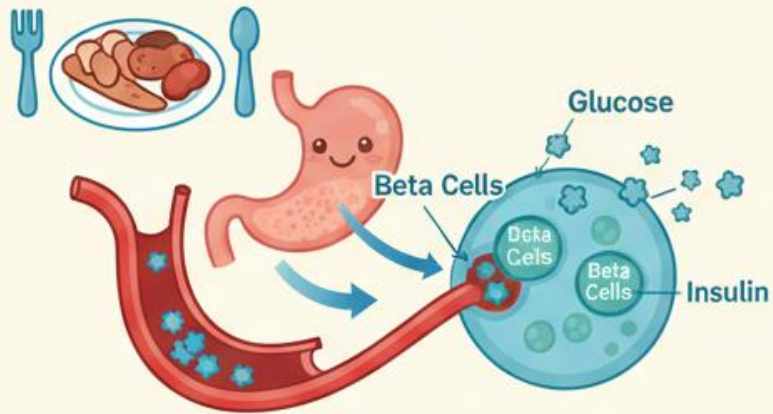
How to lower the risk

- Keep blood sugar as controlled as possible
- Treat blood pressure and cholesterol
- Stay active and avoid smoking
- Take diabetes medicines as advised

Prevention

small daily habits
protect the heart

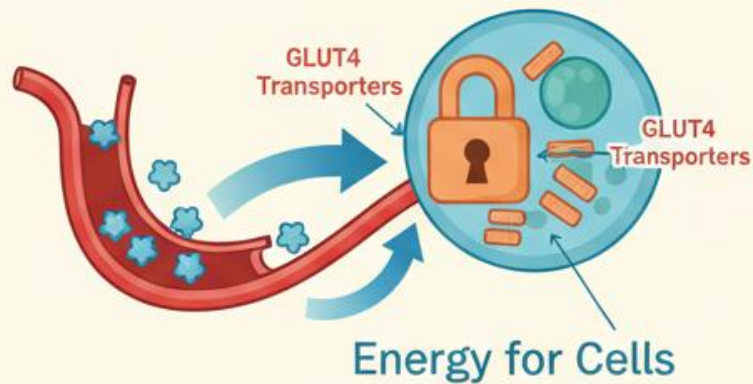
1. Meal & Insulin Release



2. Insulin Unlocks Cells



3. Glucose Enters Cells



4. No Insulin = Starvation



GLUCOSE STUCK!

Risk reduction priorities

- Tight blood pressure control
- LDL lowering with statin-based therapy
- Smoking cessation and exercise
- Use of glucose-lowering drugs with CV benefit

ABC

A1c, blood pressure,
cholesterol

DIABETES PREVENTION IN SOUTH ASIANS

Practical everyday habits for better health



Small steps
matter!

PREVENTION IS BETTER THAN CURE/ CONTROL

Foods that may help reduce blood sugar spike

Rice soaked and cooked with removal of starchy water and stored in the fridge.

Bread from freezer toasted direct

Methi seeds soaked overnight and had in the morning

Leafy greens , broccoli, lentils, nuts and seeds

HOW DOES THIS HELP

Rice and bread have high carbohydrate load and higher sugar spike after consumption

Carbohydrates are important part of our balanced diet

Eating in moderation is key

Cooled rice/ frozen bread when rewarmed / toasted produces resistant starch – helps release of sugar slowly and lower spike of sugar

WHY SPIKE MATTERS

When you eat high-GI foods, your blood sugar rises fast.

Insulin drives the blood sugar down.

That's normal and necessary. The problem is when it happens repeatedly over time.



Frequent insulin spikes can cause your cells to gradually stop responding to insulin as well

This is called **insulin resistance** — a major driver of weight gain and type 2 diabetes



Excess glucose gets converted to fat when there's more than your cells can use.

SOUTH ASIANS ARE AT HIGHER RISK

- **Family history/genetics**
- **Higher visceral fat at lower BMI**
- **Refined carbs & sugary drinks**
- **Sedentary lifestyle**
- **Poor sleep & stress**

SIMPLE LIFESTYLE CHANGES

- **Walk 10–15 min after meals**
- **Strength exercises 2–3x/week**
- **Fill half plate with vegetables**
- **Choose whole grains**
- **Sleep 7–9 h**

MINDFUL EATING & MIND–BODY CONNECTION

Pause before eating

Eat slowly

Notice hunger/fullness

Reduce distractions

Food affects energy, focus & mood

TAKE HOME MESSAGE

Small consistent changes beat perfection.

**Move after meals,
eat mindfully,
stay active,
and
have regular health checks.**



COMMON MYTHS

- MY BLOOD SUGAR LEVELS ARE NORMAL
 - WHAT IS NORMAL – WHO –
 - MY BP IS NORMAL –
 - MY CHOLESTEROL IS NORMAL
-
- I AM TAKING TOO MANY TABLETS – DO I NEED SO MANY
 - I AM HAVING SIDE EFFECTS – SO I HAVE STOPPED – IS THIS OK

Key takeaway

Diabetes harms the cardiovascular system through vascular injury, atherosclerosis, myocardial dysfunction, and thrombosis.

Early prevention and aggressive risk-factor management save lives.

THANK YOU