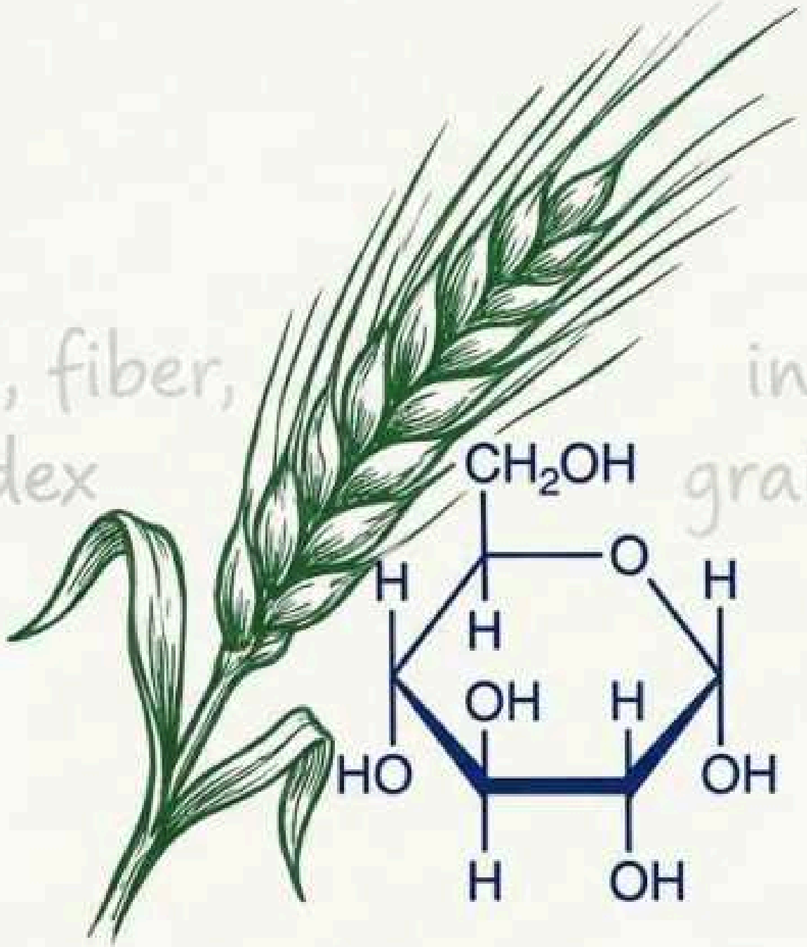
¶ 2.1

Sugars, starch, fiber, glycemic index

insulin, diabetes, grains, sweeteners.



Carbohydrates, Fiber, and Blood Sugar

NUTR 101 B — Lecture 2

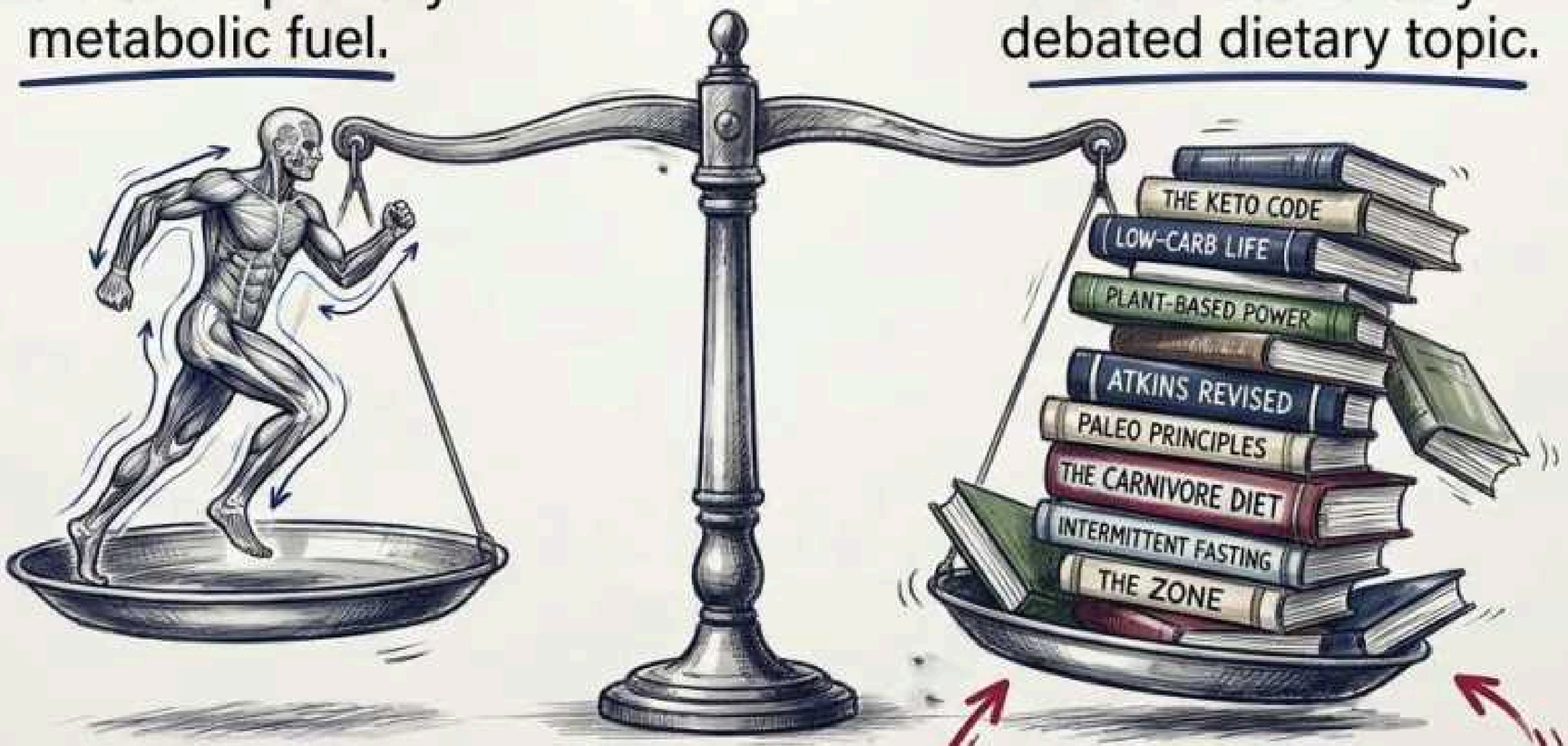
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Fuel vs. Debate

¶2.2

The world's primary metabolic fuel.

The most fiercely debated dietary topic.



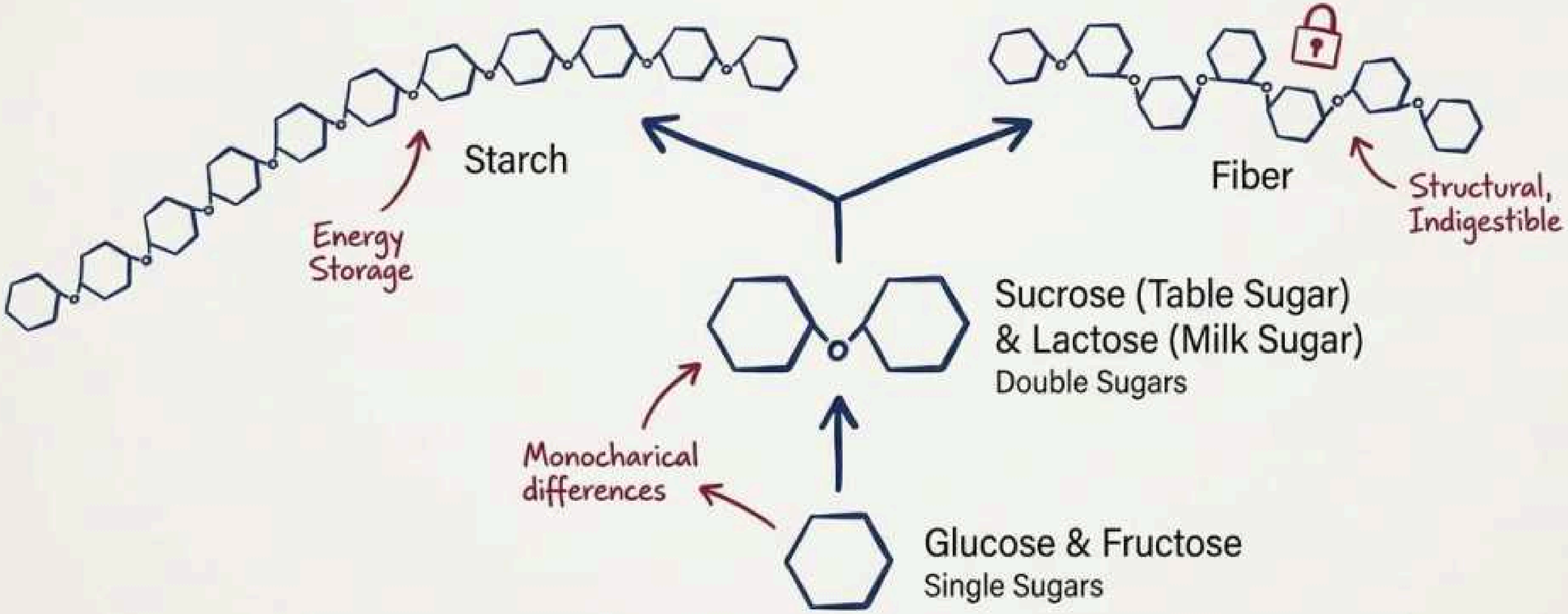
The Goal: Separate sound science from slogans based on physiological evidence.

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The Chemical Architecture

¶ 2.3

Carbohydrates are built entirely from simple sugar units.
The arrangement of the chain dictates its function.

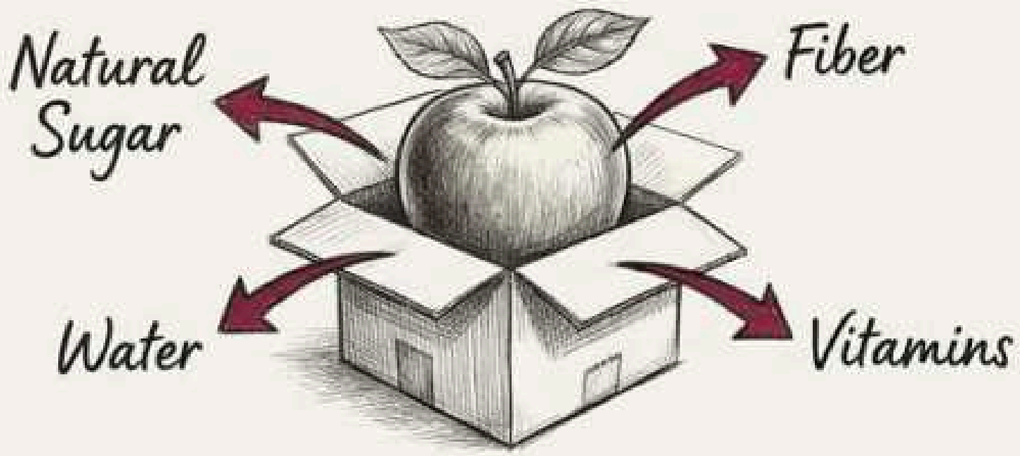


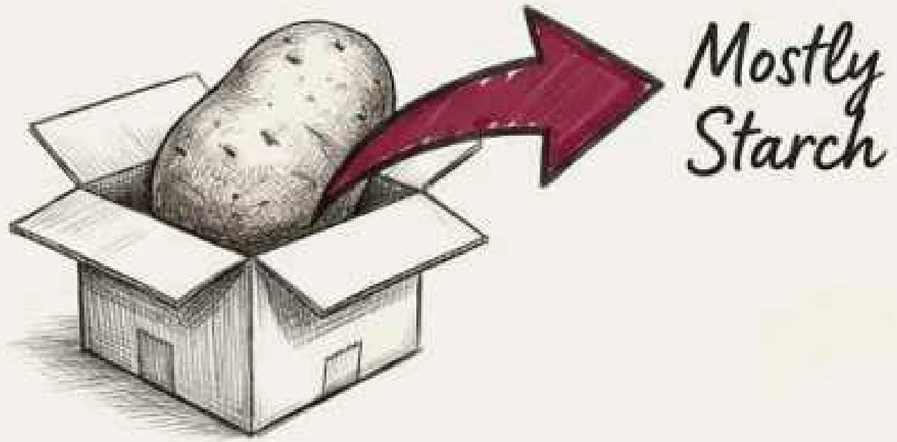
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The Packaging Matters

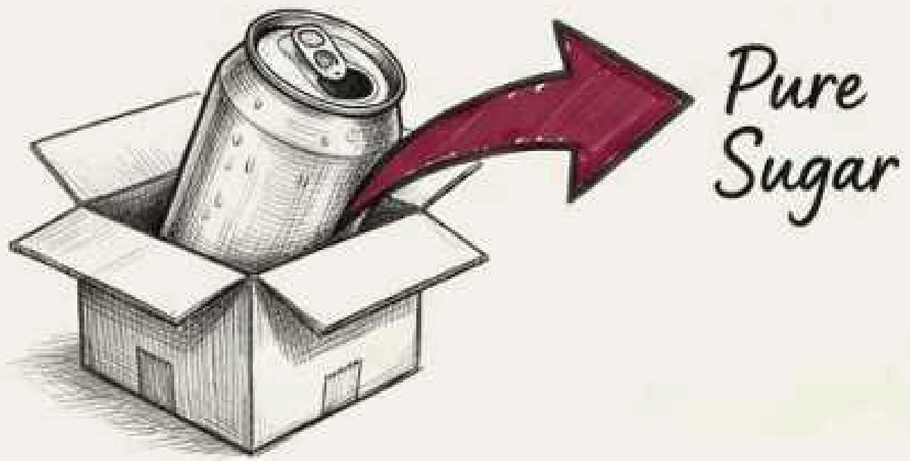
¶ 2.4

A **carbohydrate** does not exist in a vacuum; the surrounding delivery system (fiber, water, protein) is just as important as the molecule itself.









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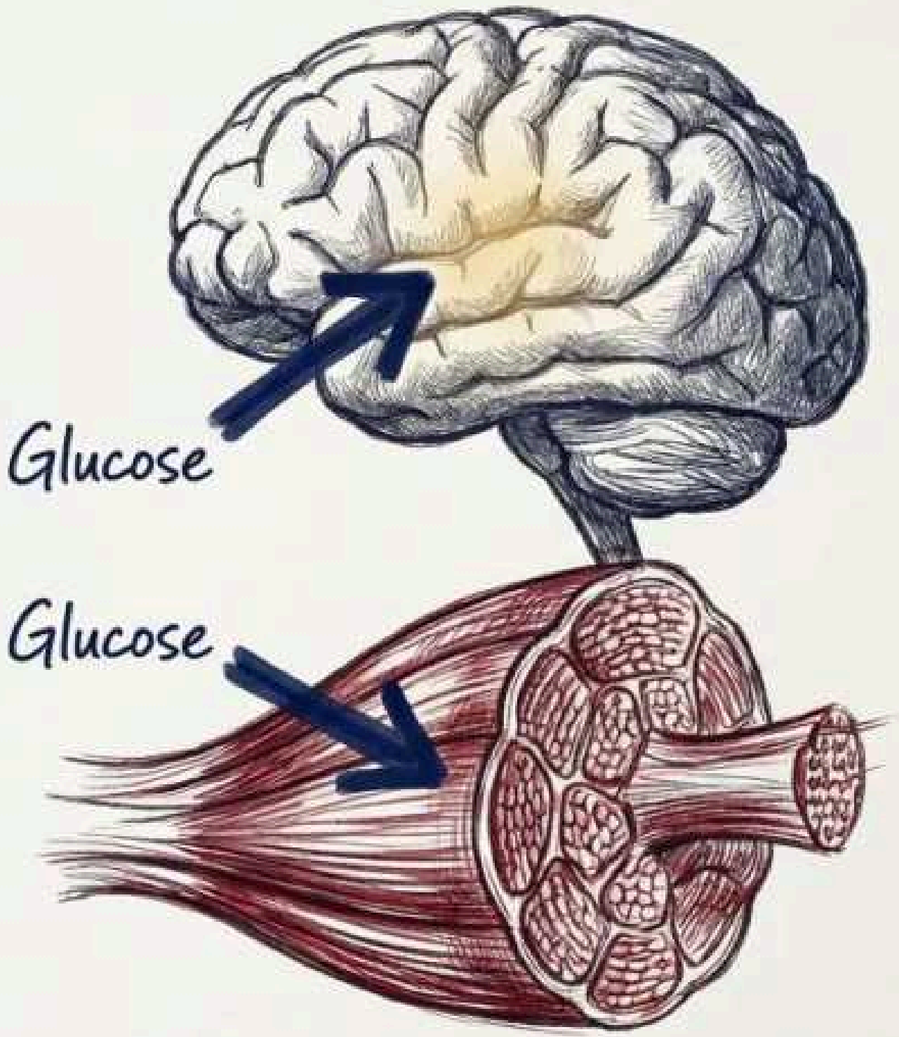
The Body's Preferred Fuel

¶ 2.5

Brain and muscles preferentially run on glucose.

No single carbohydrate food is strictly essential (the body can synthesize glucose from other materials if forced).

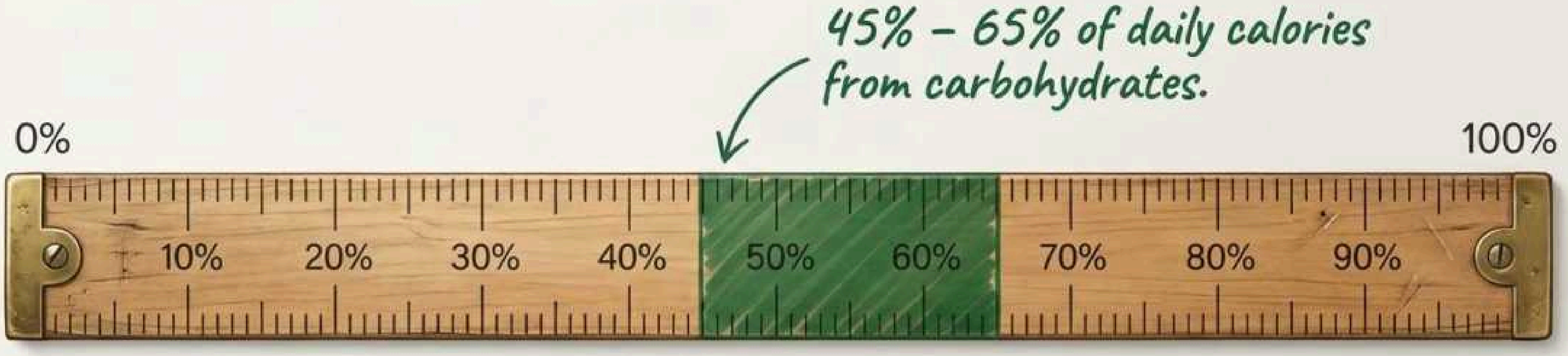
Official Recommended Minimum:
≥130 grams / day.



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Acceptable Macronutrient Distribution Range (AMDR)

¶ 2.6



This is a broad band, not a strict target. Many healthy populations thrive outside these exact numbers.

Source Quality > Exact Percentage

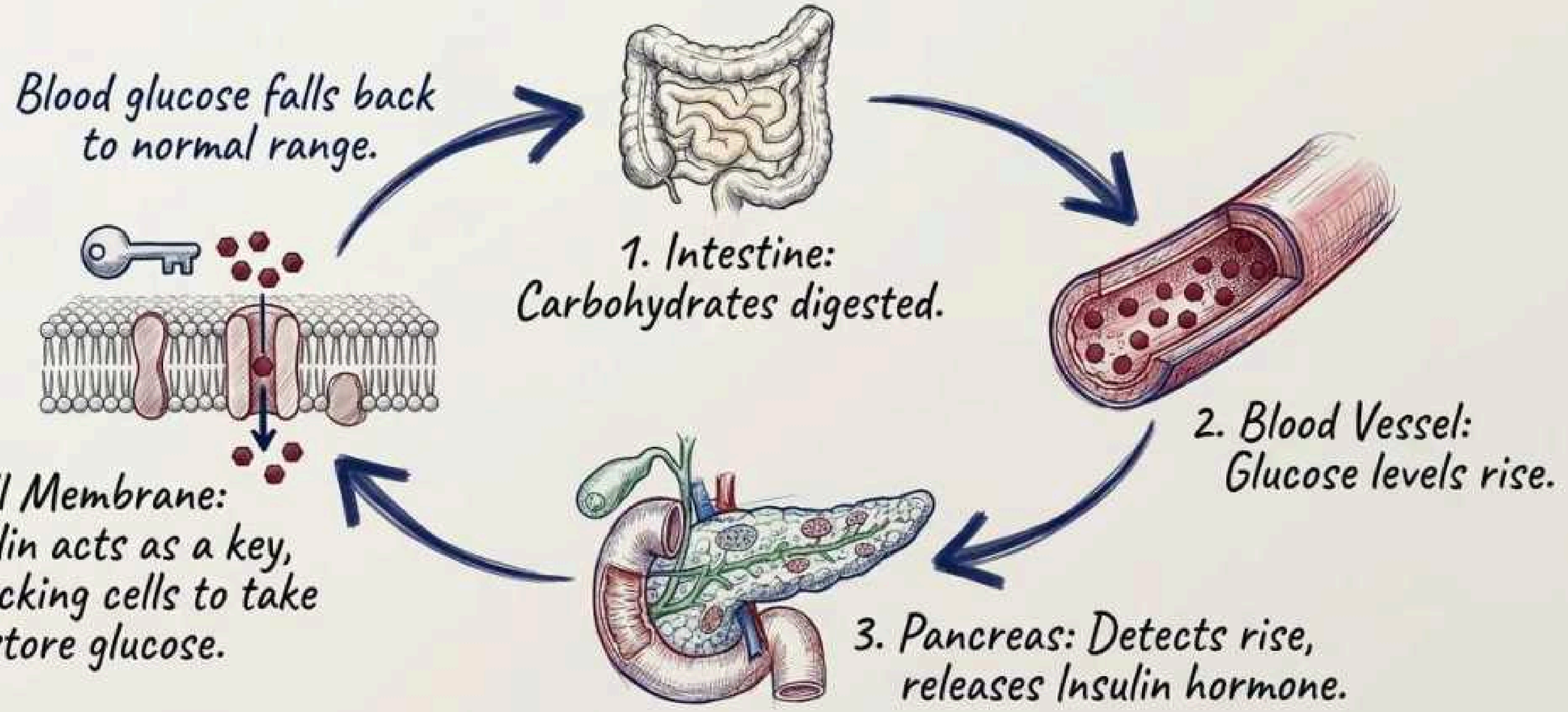
What the carbohydrate comes from matters far more than hitting a precise ratio.

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The Blood Sugar Lifecycle

¶ 2.7

In a healthy person, this system provides quiet, continuous regulation with manageable, small rises after meals.



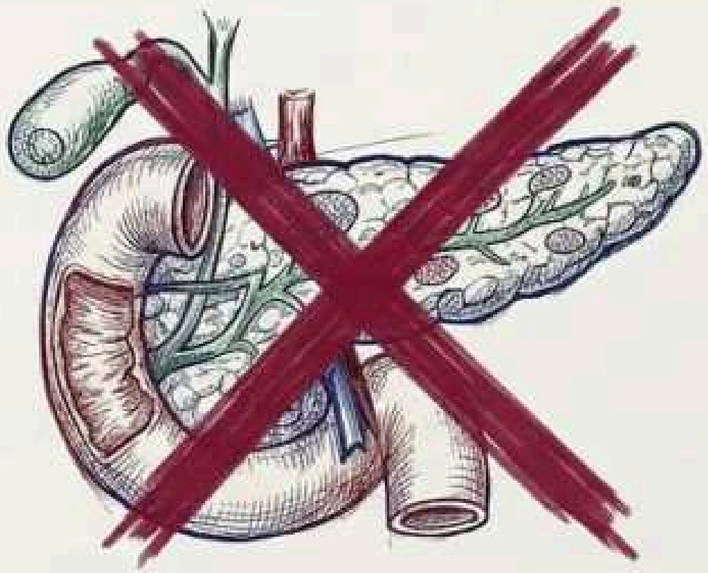
Gemini Notebook

System Failure: Diabetes

¶ 2.8

Unregulated high blood glucose damages blood vessels and nerves over time.

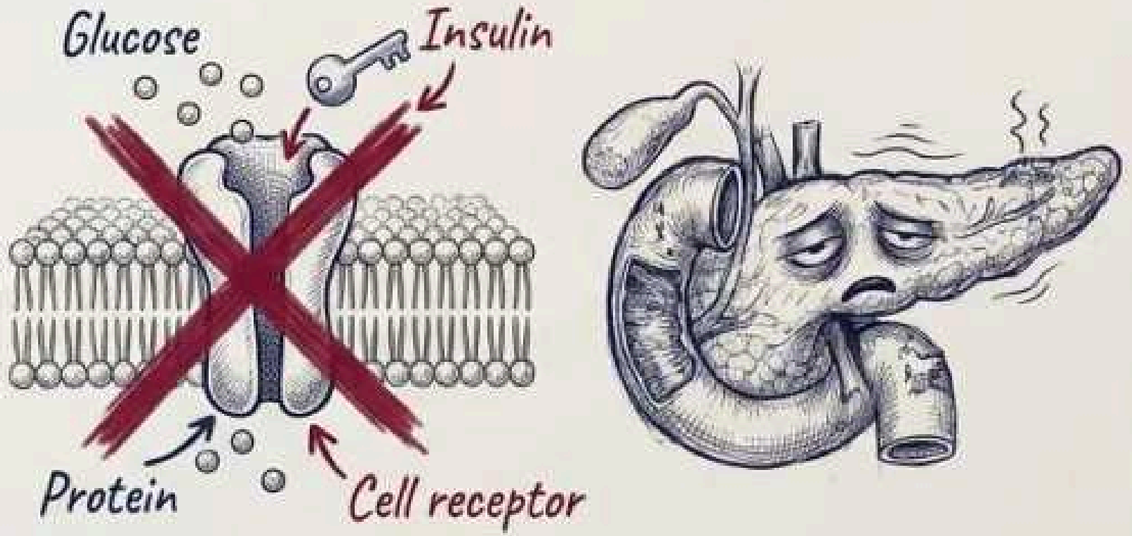
Type 1 Diabetes



Production Failure.

(Body makes almost no insulin).

Type 2 Diabetes



Receptor Resistance.

(Cells respond poorly; pancreas eventually cannot keep up).

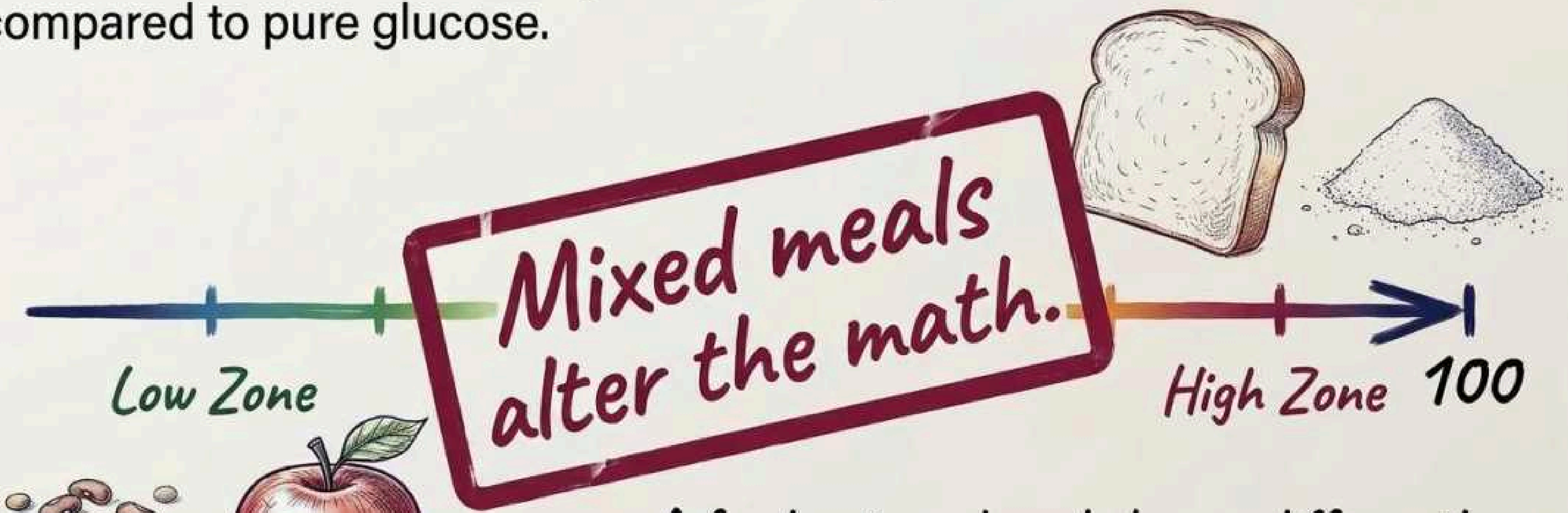
⚠ Note: Requires dedicated medical guidance, not general nutrition advice.

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The Glycemic Index (GI)

¶ 2.9

Ranks foods by how fast they raise blood glucose compared to pure glucose.

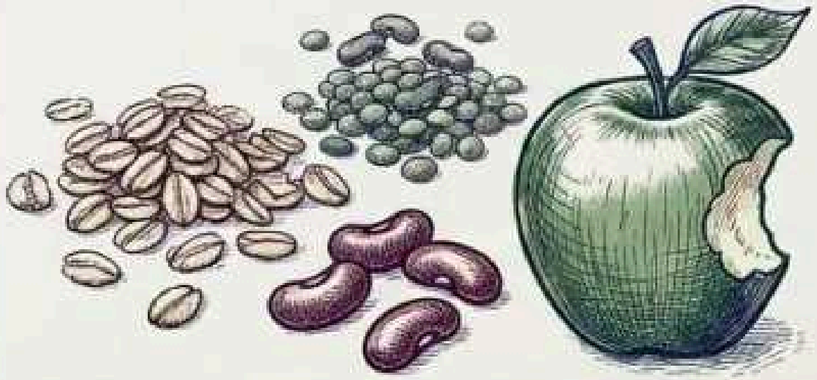
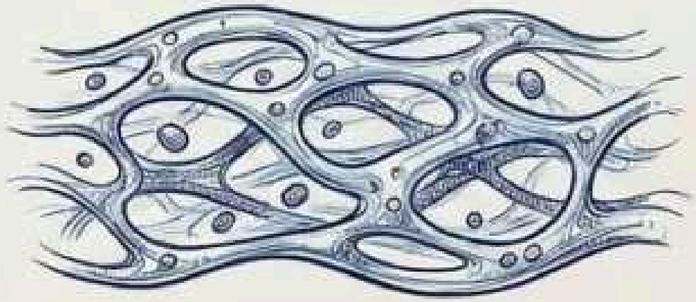


A food eaten alone behaves differently. Fat, protein, and fiber all slow digestion, changing the real-world impact.

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The Two Faces of Fiber

¶ 2.10

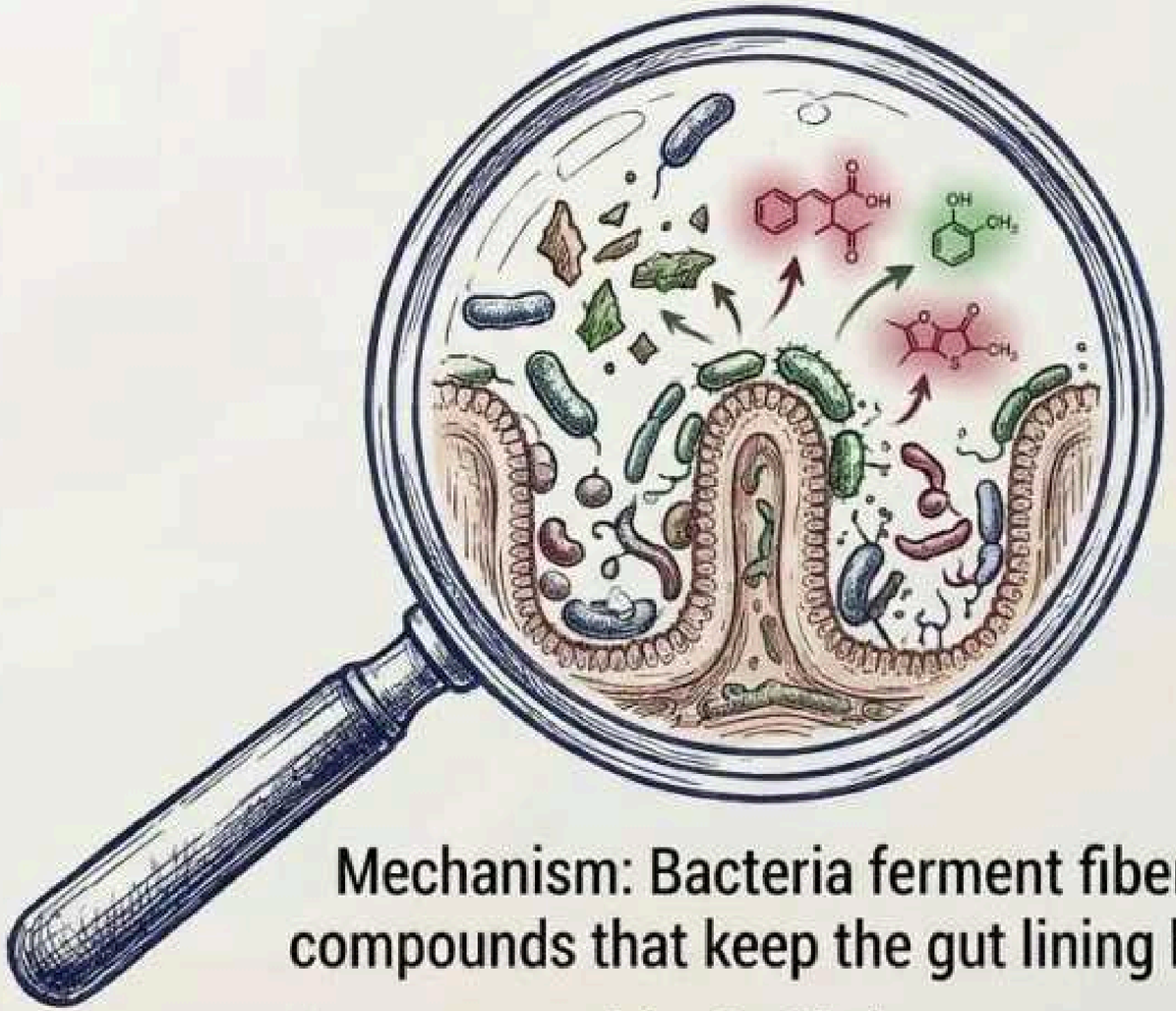
	Soluble Fiber	Insoluble Fiber
Soluble Sources		
Soluble Action	 *Forms a gel. Slows absorption, can lower blood cholesterol.*	 *Adds bulk. Helps speed the movement of food through the gut.*

Both forms are indigestible by human enzymes, yet both are highly functional.

Gemini Notebook

Feeding the Microbiome

¶ 2.11



Mechanism: Bacteria ferment fiber into compounds that keep the gut lining healthy.

Outcomes: Linked with lower rates of heart disease, Type 2 diabetes, and bowel cancer.

Target (Women)

25g / day

Target (Men)

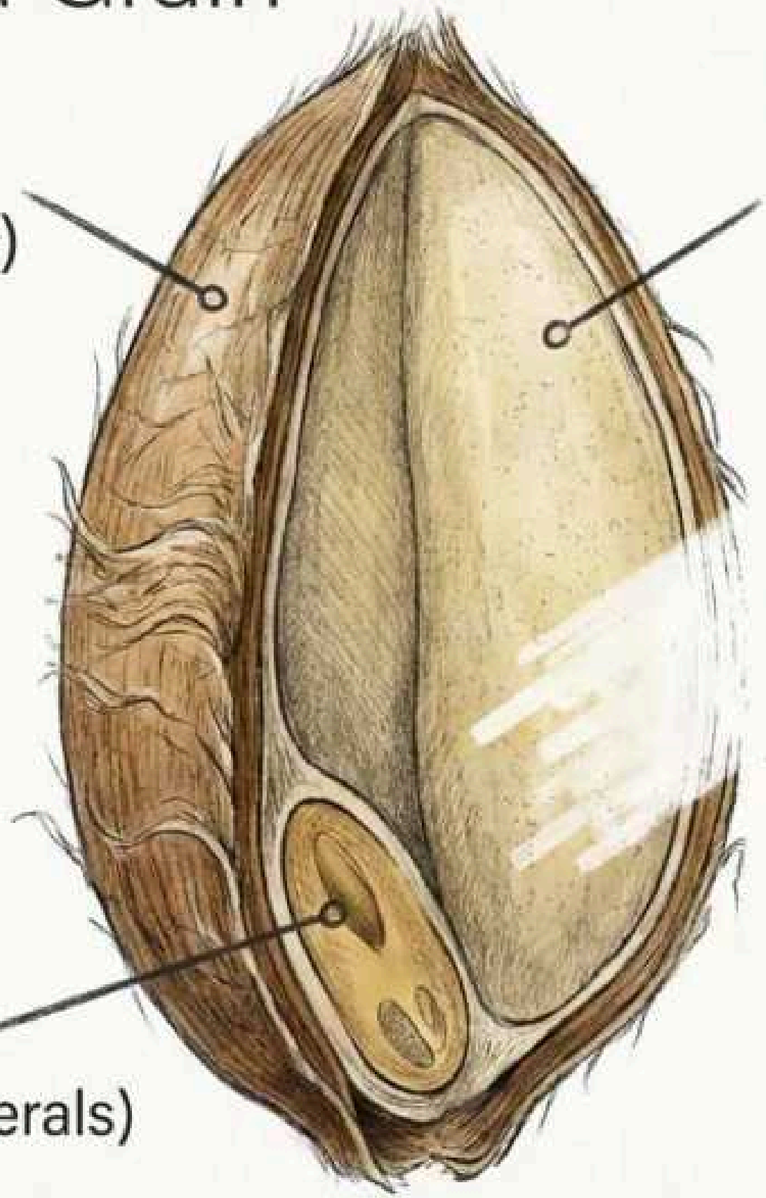
38g / day

Reality: Most adults eat much less.

Gemini Notebook

The Anatomy of a Grain

¶ 2.12



Whole Grains:
Retain the bran and germ (and their nutrients). Observational studies link to **lower risk of heart disease** and **early death.**



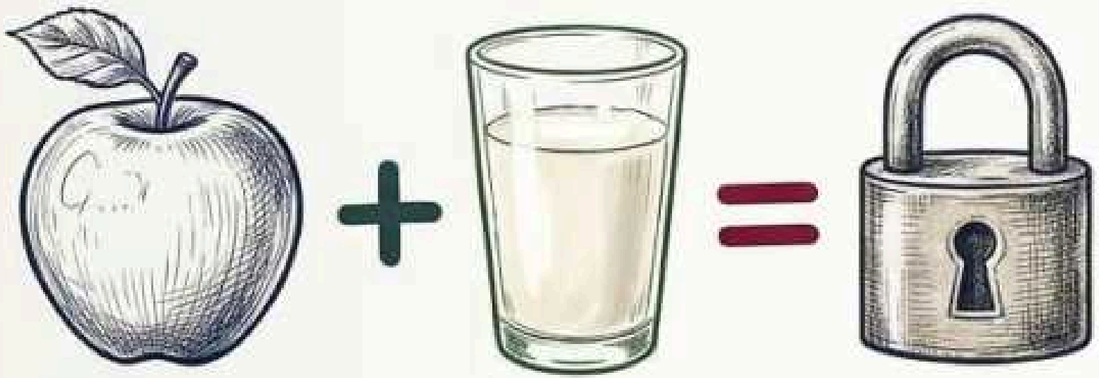
Refined: Strip away the nutrients, leaving mostly starch.

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The Sugar Context: Natural vs. Added

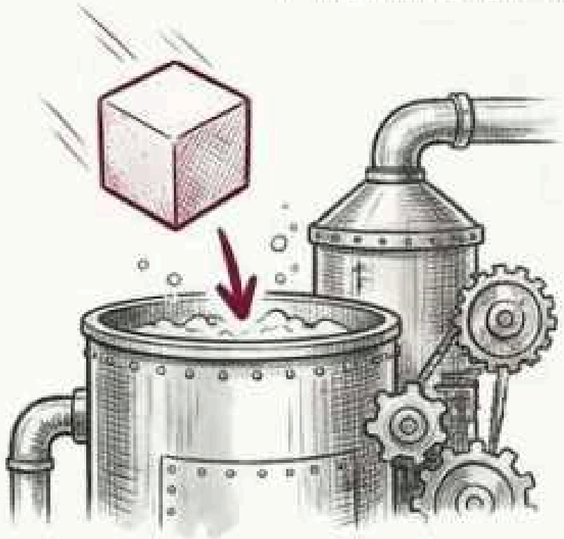
¶ 2.13

Natural Sugars

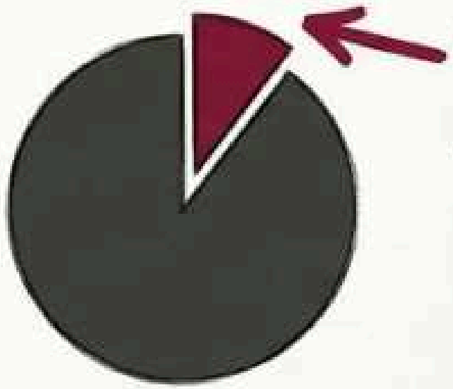


Occur naturally, come packaged with other nutrients. Hard to overeat.

Added Sugars



Inserted during manufacture or at the table.

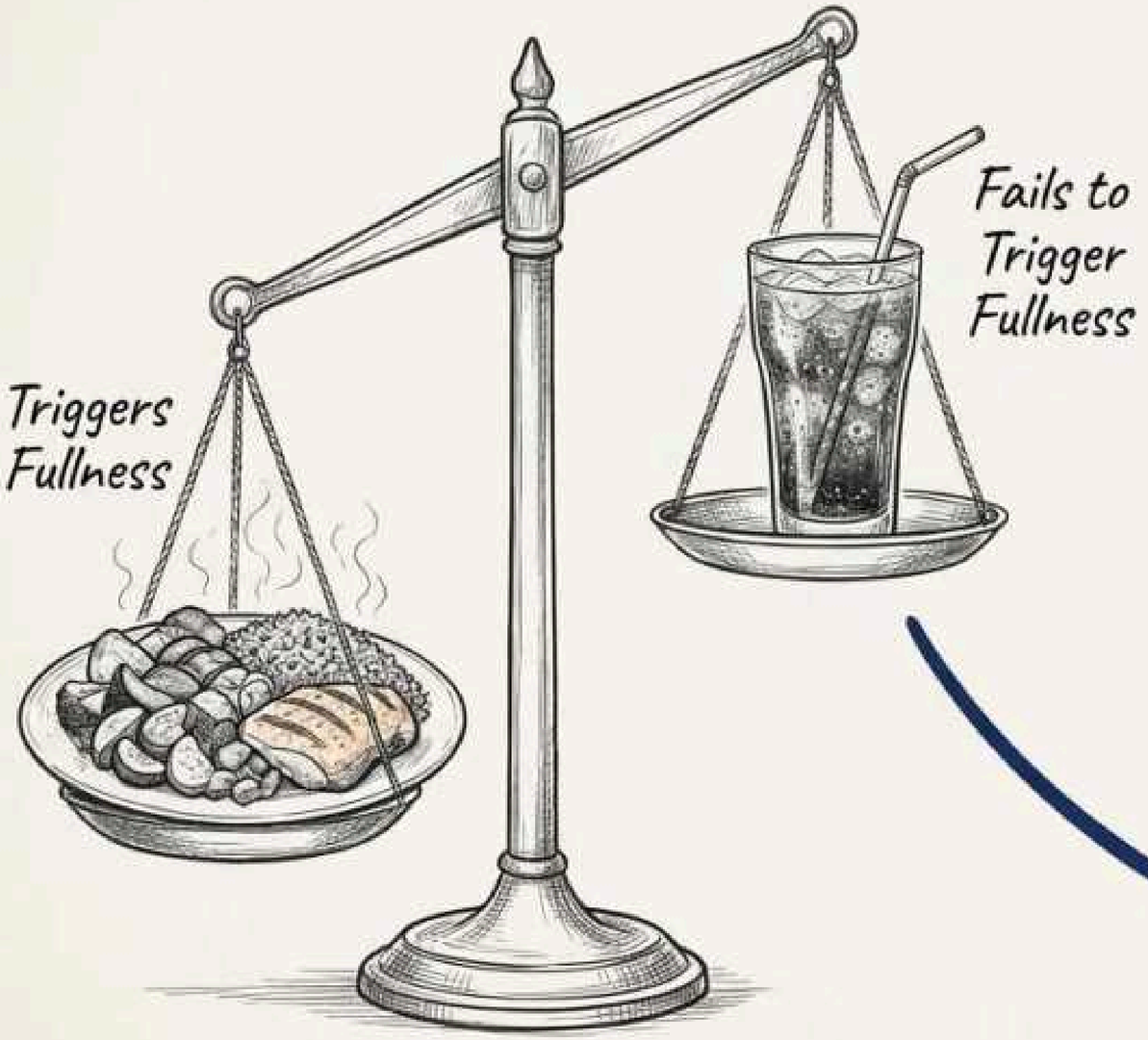


The Limit: **Keep added sugars below 10% of total calories** (WHO suggests going even lower).

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The Problem with Liquid Calories

¶ 2.14



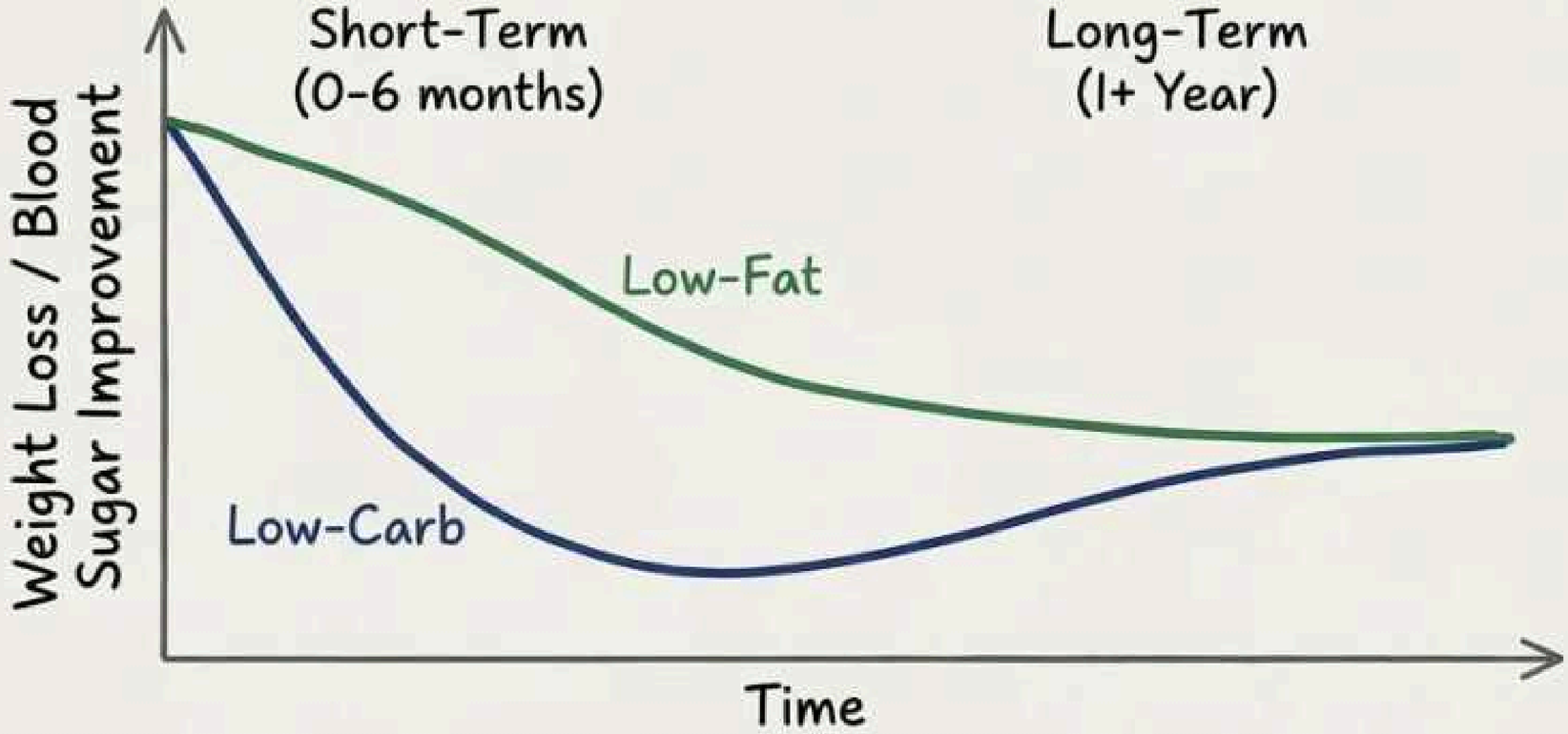
- ✓ ***Mechanism:*** Sugary drinks do not satisfy hunger the way solid food does. People fail to compensate by eating less later.
- ✓ ***Outcomes:*** Strongly linked to weight gain and Type 2 diabetes.
- ✓ ***Actionable Swap:*** Replacing sugary drinks with plain water is among the most well-supported small dietary changes.



Gemini Notebook

Low-Carbohydrate Diets: The Timeline

¶ 2.15



Short-Term: Trials show good initial weight loss and improved blood sugar.

Long-Term: Differences between low-carb and low-fat diets become remarkably small.

The Real Predictor: Success is dictated by the ability to **stick with the plan,** and the **quality** of the food matters more than the dietary label.

Gemini Notebook

Digestion Issues: Two Distinct Mechanisms

¶ 2.16

Lactose Intolerance



Lactose Intolerance: Missing the specific enzyme (lactase) needed to split milk sugar.
Common in adults worldwide.

Coeliac Disease



Coeliac Disease: An immune reaction to the protein gluten.
Needs medical diagnosis.

The **Gluten-Free** *Reality*: Essential for those with Coeliac, but not shown to benefit the general public.

Gemini Notebook

Zero-Calorie Sweeteners

¶ 2.17

The Status: Aspartame, sucralose, and stevia are judged safe within set limits by regulators.

safe within limits





Mixed evidence

The Caveat: In 2023, the WHO advised against relying on them for long-term weight control, as evidence is mixed.



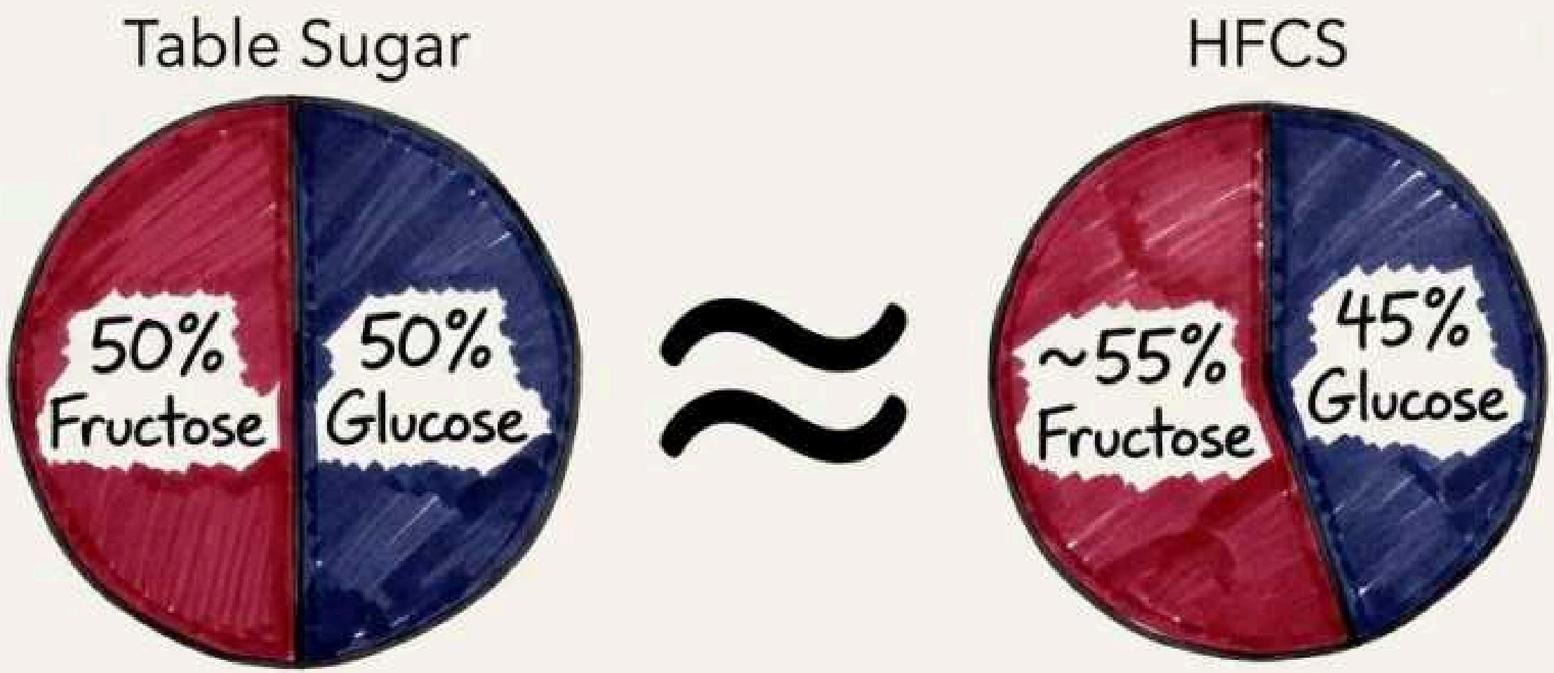


The Verdict: They may help as a short-term stepping stone away from sugary drinks, but plain water remains the gold standard.

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¶ 2.18

High-Fructose Corn Syrup (HFCS) vs. Table Sugar



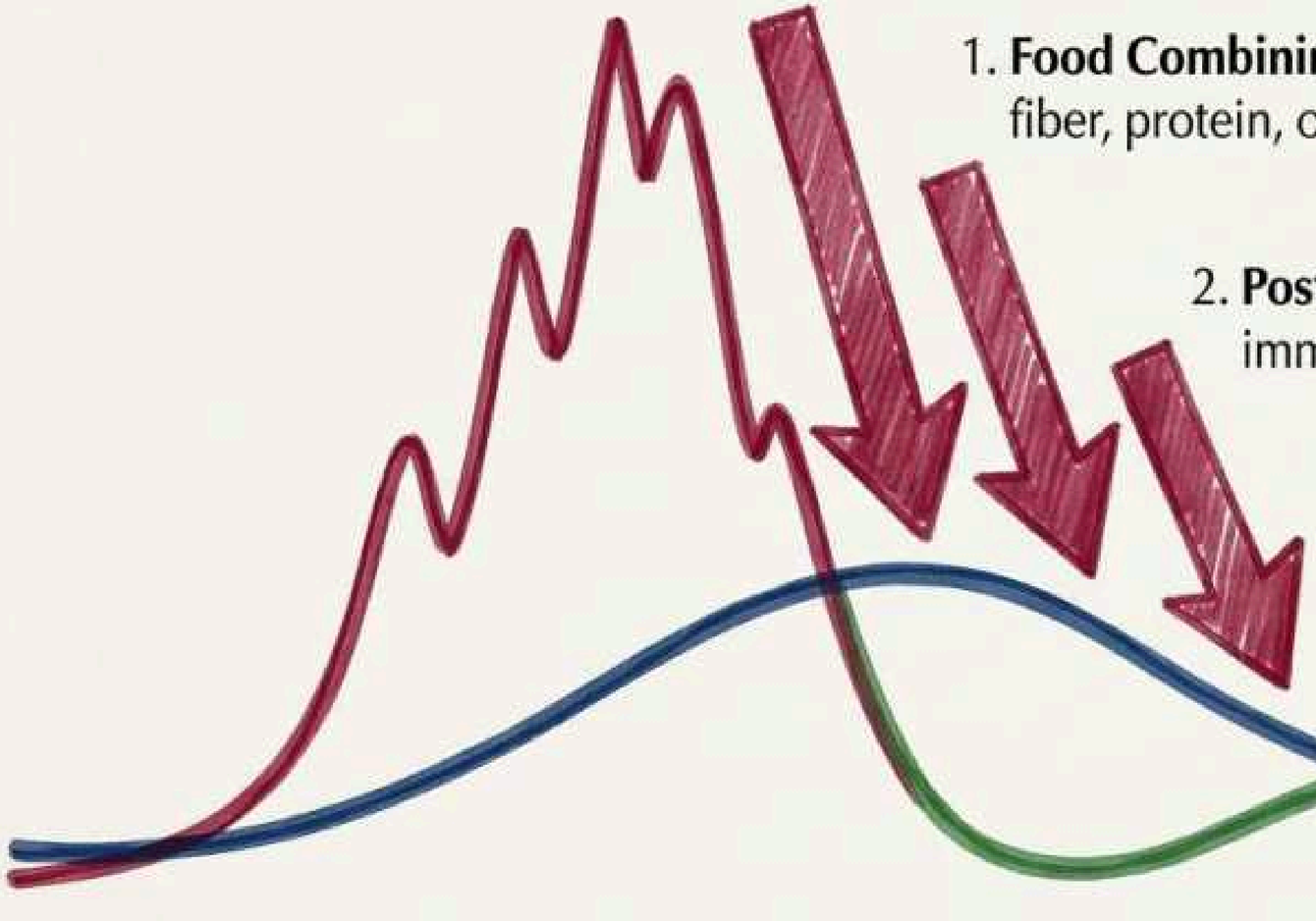
The Chemistry: They are chemically very similar, and the human body handles them in much the same way.

The Real Concern: The danger is not the specific molecular source, but the large total amount of added sugar consumed overall.

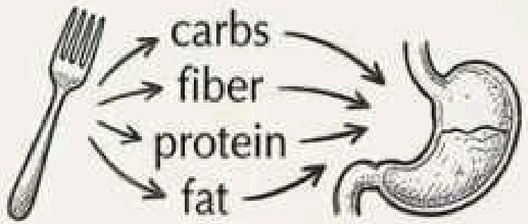
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Habits that Soften the Spike

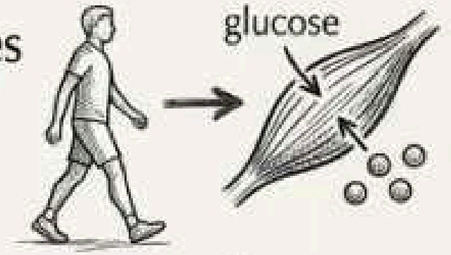
¶ 2.19



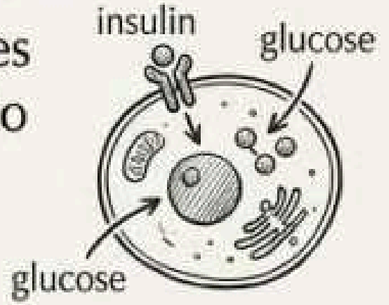
1. **Food Combining:** Eating carbs with fiber, protein, or fat slows digestion.



2. **Post-Meal Walk:** Helps muscles immediately take up glucose.



3. **Regular Exercise:** Makes cells more responsive to insulin overall.



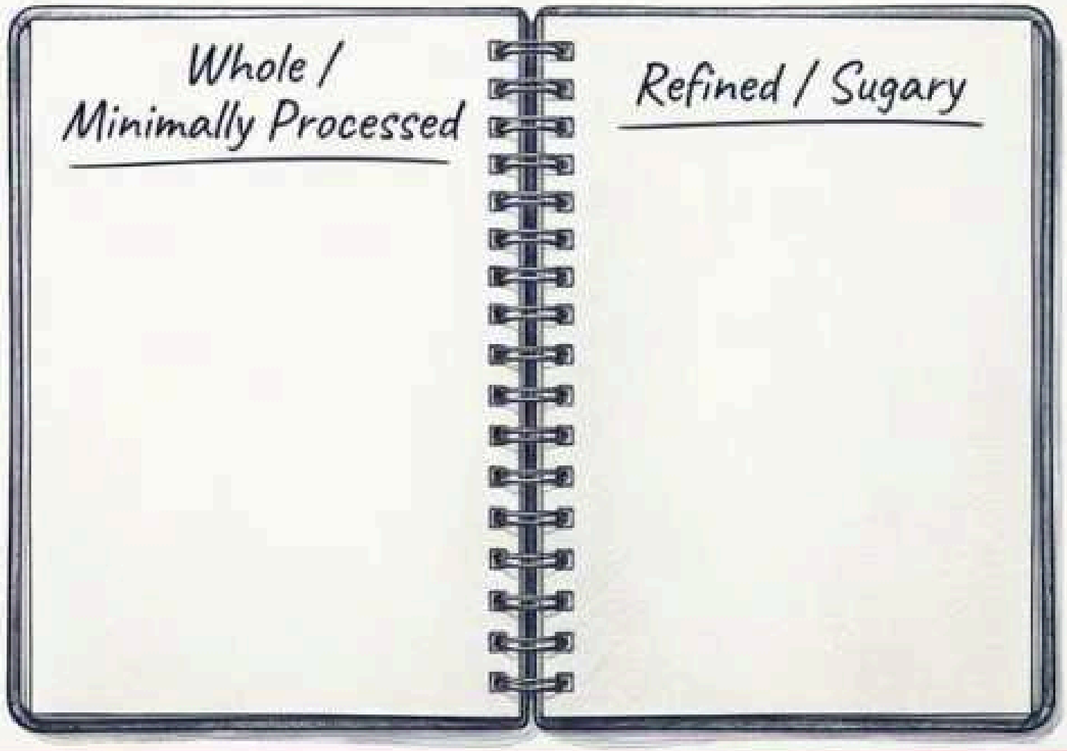
(Note: While Continuous Glucose Monitors (CGMs) are trendy, it is not yet clear that tracking daily swings improves health for healthy people).

Gemini Notebook

Reflection & Application

¶ 2.20

Homework: Look at the carbohydrates you ate yesterday. Sort them into the two columns below.



The Challenge: Identify exactly one small swap where you could add fiber without making your life harder. Write down a swap you will *actually* keep.

Gemini Notebook

¶ 2.21

Up Next: Protein and Fat

In Lecture 3, we turn our attention to the two remaining macronutrients—and the ones that carry the most pervasive myths.



Gemini Notebook