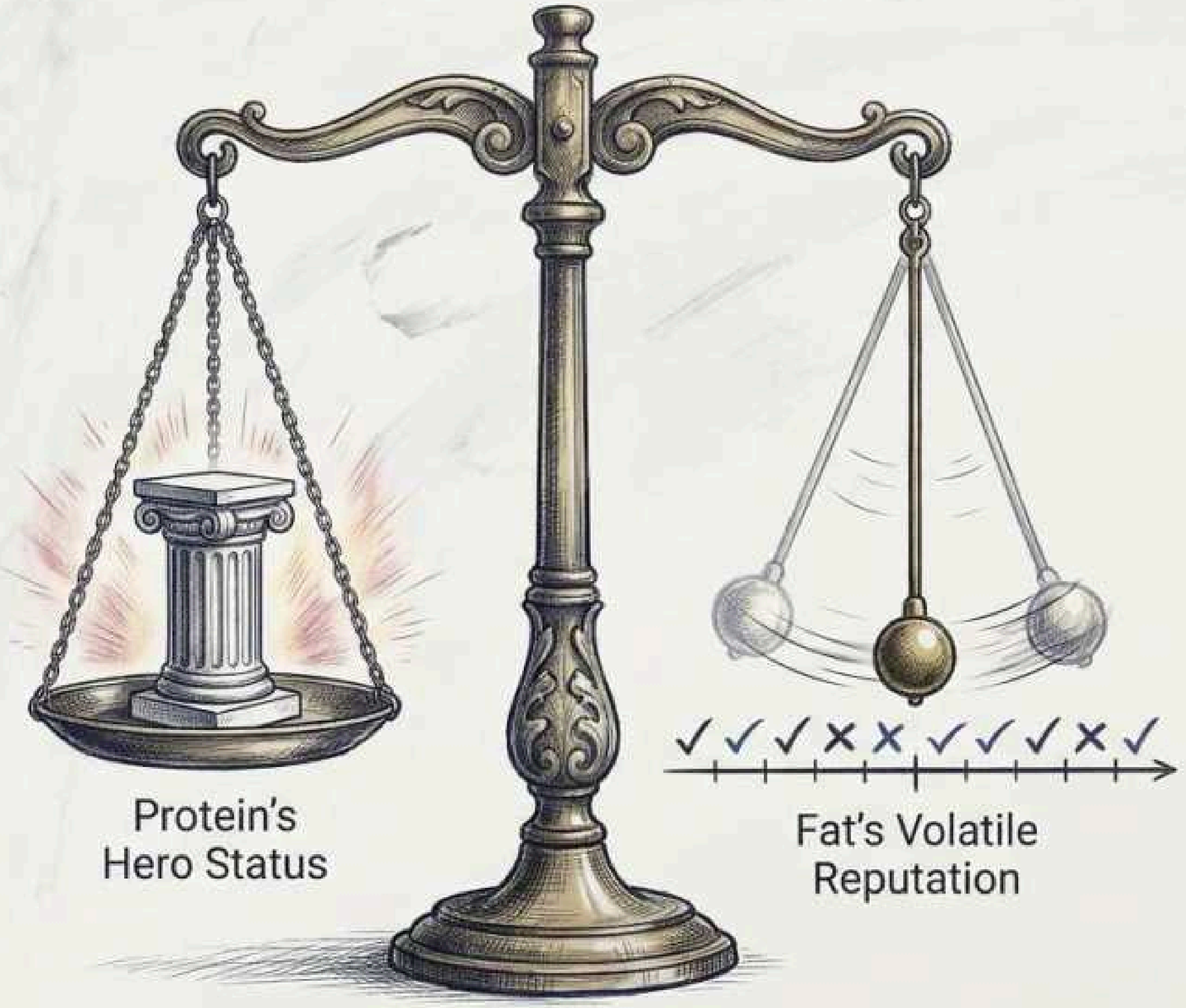


NUTR 101 B — Lecture 3

Protein and Fat: Biology, Requirements, and Evidence

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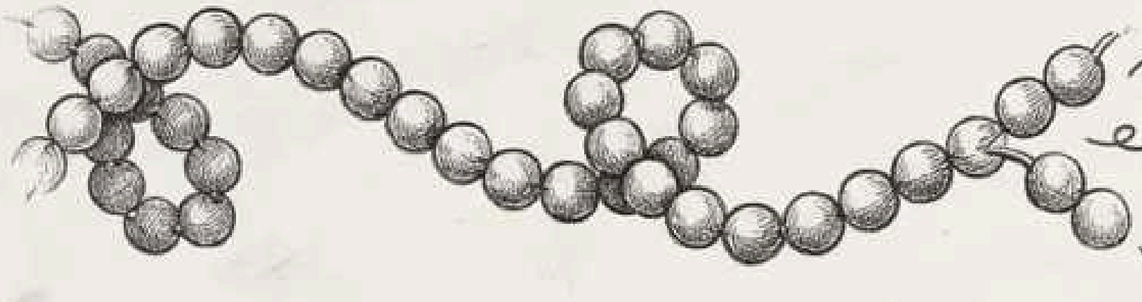


Both reputations demand a critical lens.

1. True biological functions
2. Evidence-based dietary amounts
3. Why type supersedes amount

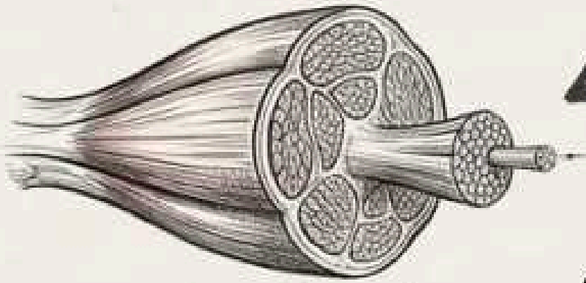
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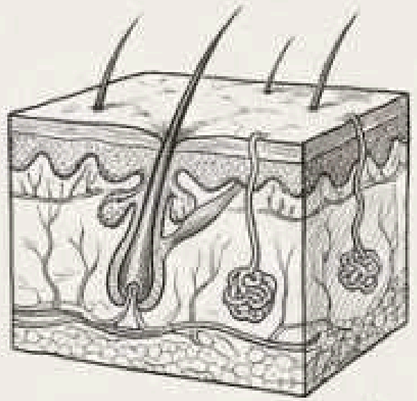
Protein = $\sum$ (Amino Acids)



The 20 Building Blocks:

- 11 = Synthesized internally by the body
- 9 = Essential (Must be acquired from food)



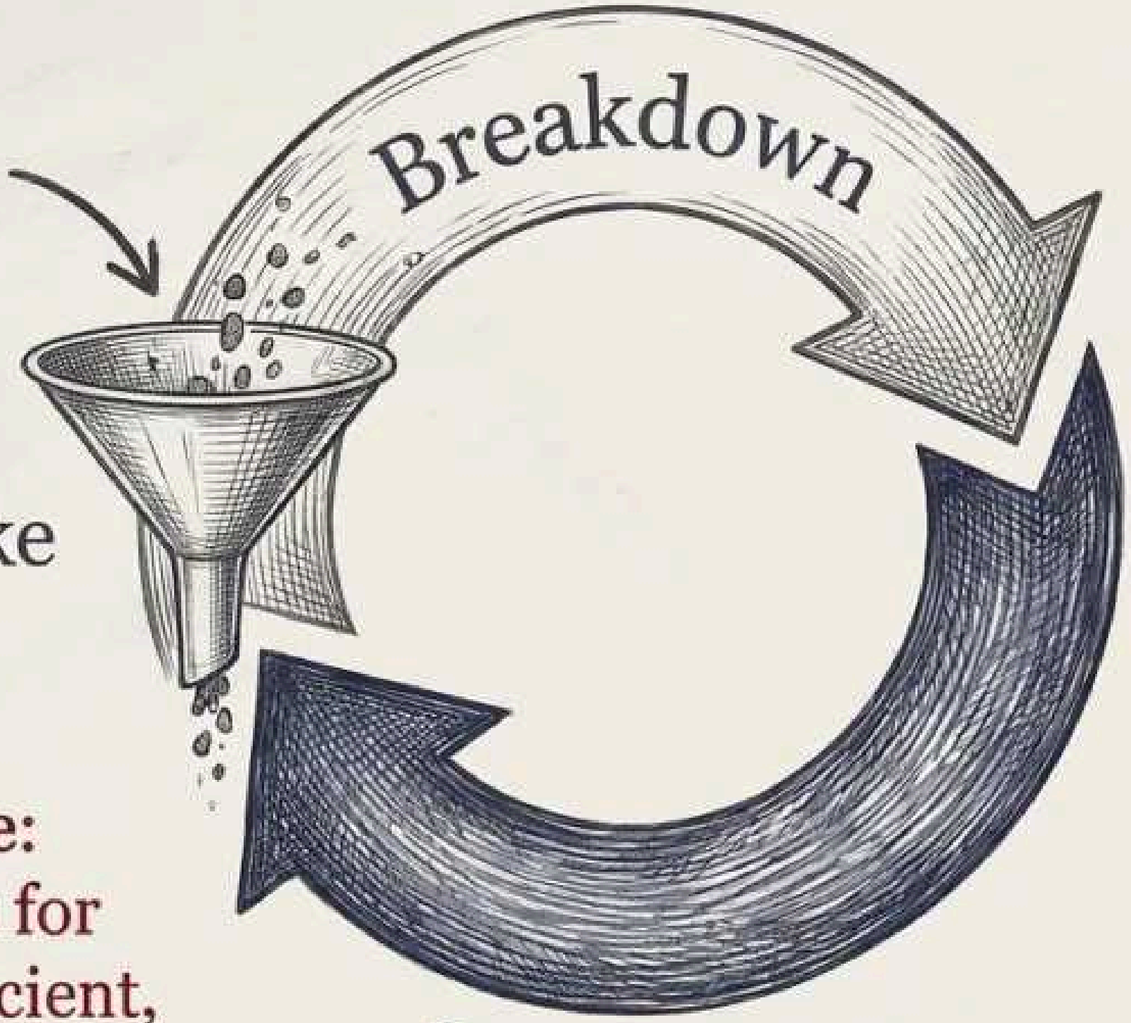


Functions: Forms muscle, enzymes, antibodies, hormones, and the structure of skin and bone.

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NO Storage Tank





Core Principle:
The body does NOT store protein like it stores fat.

Requirement:
Demands a steady dietary supply based on body weight.

Warning Note:
Burning protein for energy is an inefficient, emergency response.

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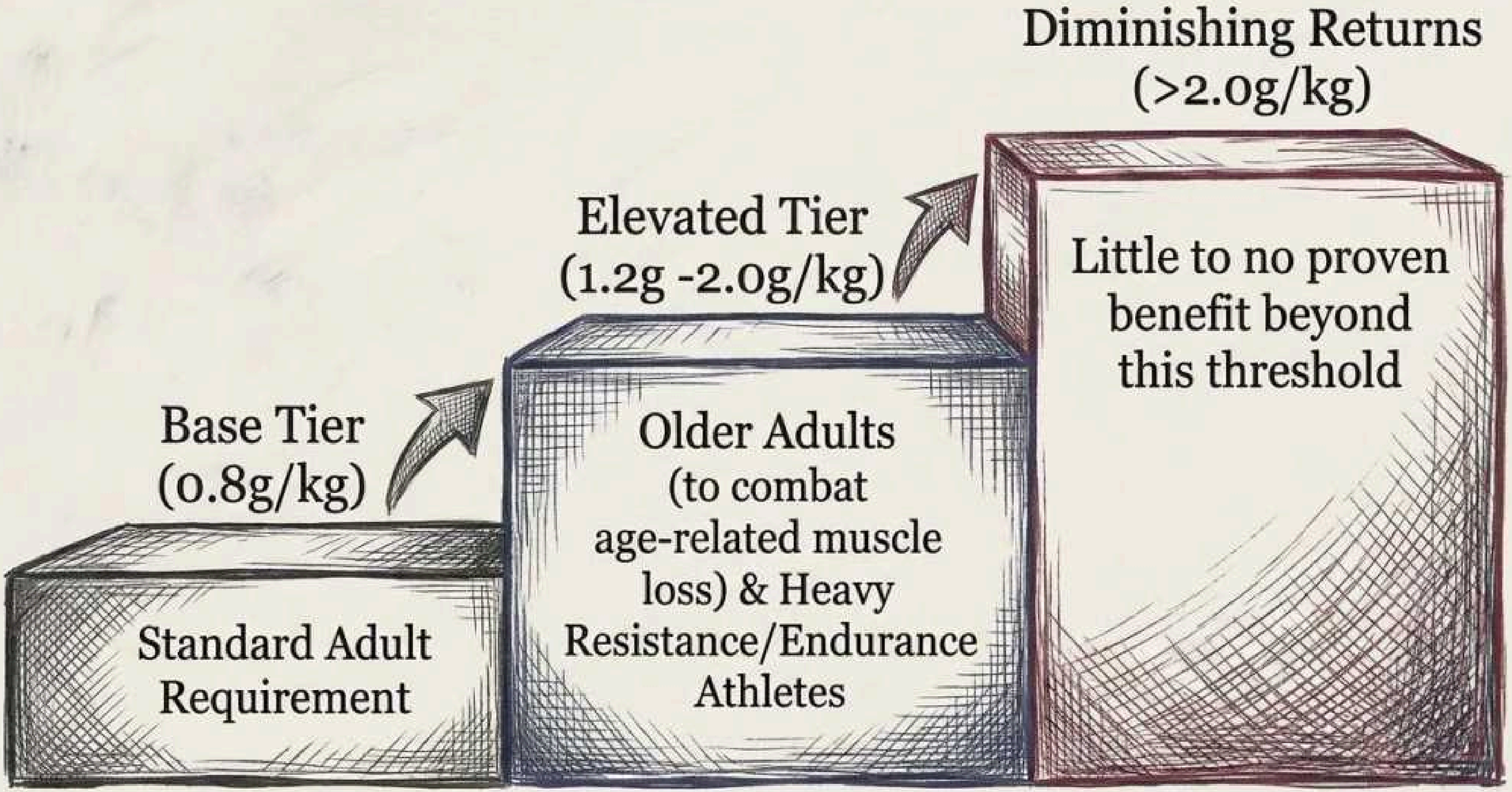
0.8g x Body Weight (kg) =

= Daily Protein (g)

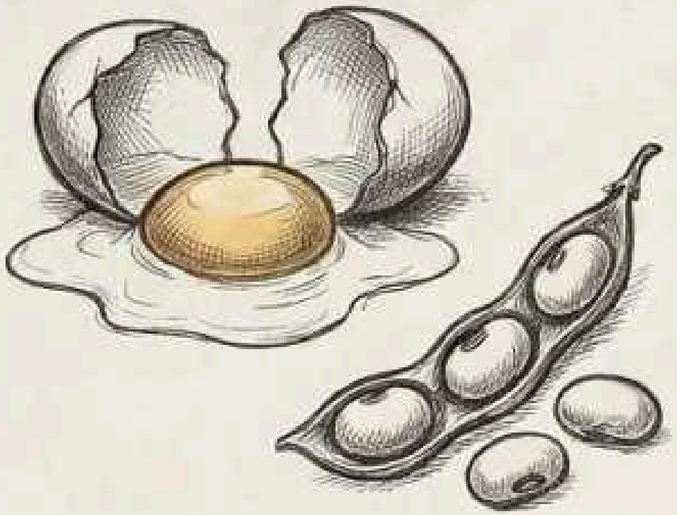
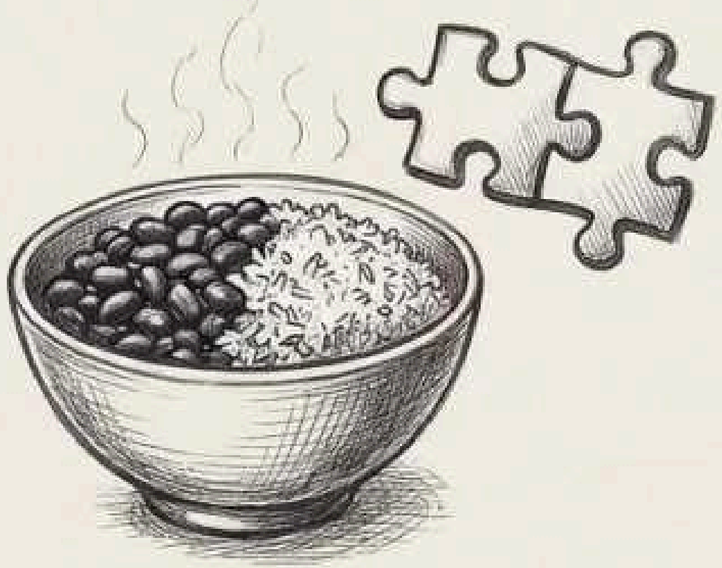
Example: 0.8g x 70kg = 56g per day

[Global Context Notation: Deficiency is rare in wealthy nations. It remains a critical risk primarily in regions experiencing food scarcity.]

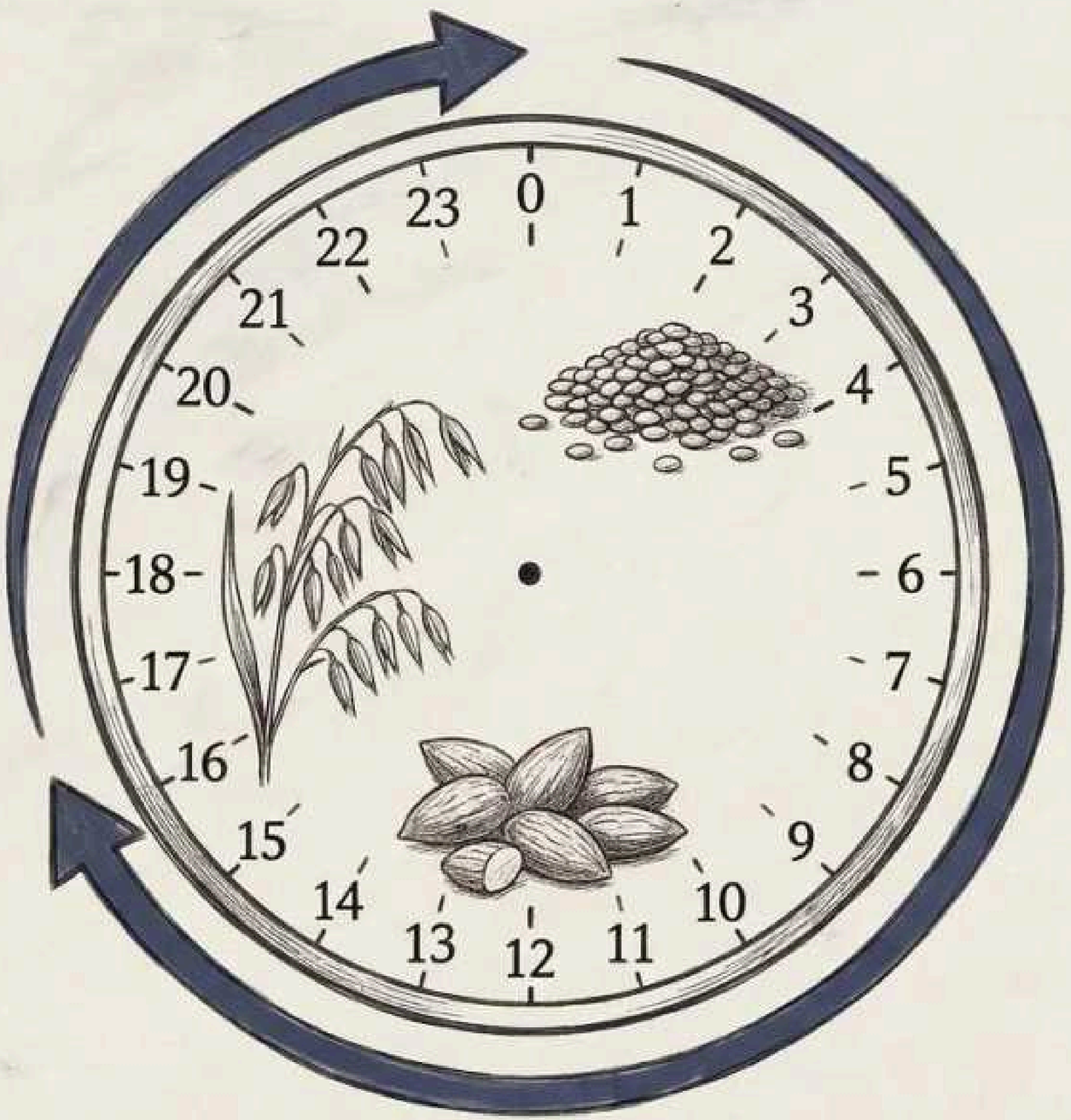
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Complete Proteins (All 9 Essentials)	Incomplete Proteins (Missing 1+ Essentials)	Complementary Proteins
		
Animal foods (meat, fish, eggs, dairy). Exceptional plant exceptions: Soy and Quinoa.	Most plant foods.	Combining incomplete sources (e.g., Beans + Rice) to achieve a complete profile.

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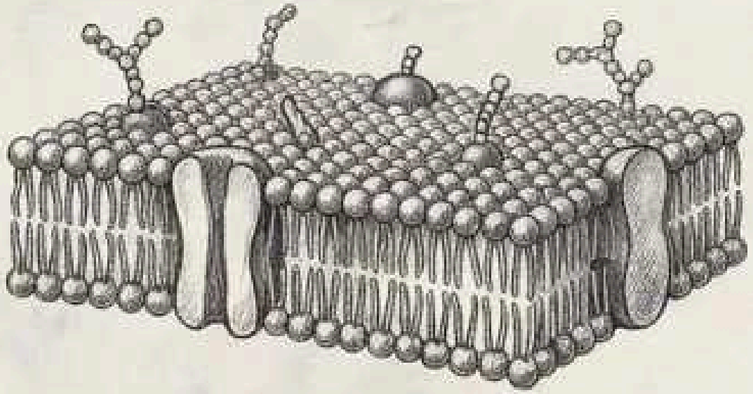
The Timeline Insight:

Plant proteins do not need to be combined in a single meal.

A varied plant diet across the day successfully supplies all 9 essential essential amino acids.

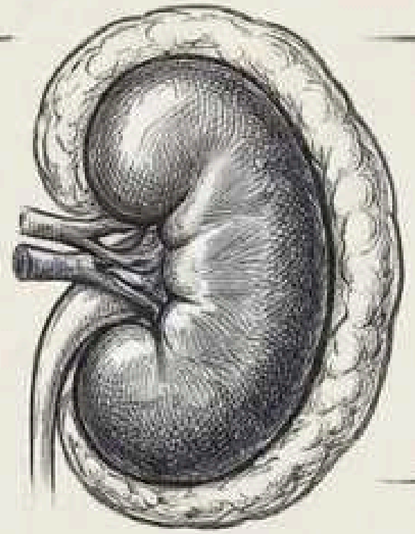
Vegan Caveat: Requires attention to Vitamin B12, which occurs naturally only in animal foods.

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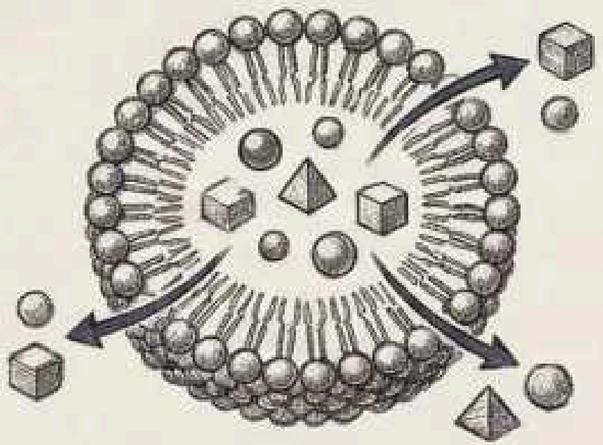
Vital Biological Roles:

Energy store | Organ cushion | Cell mem-membrane building block | Taste enhancer.



Vitamin Transport:

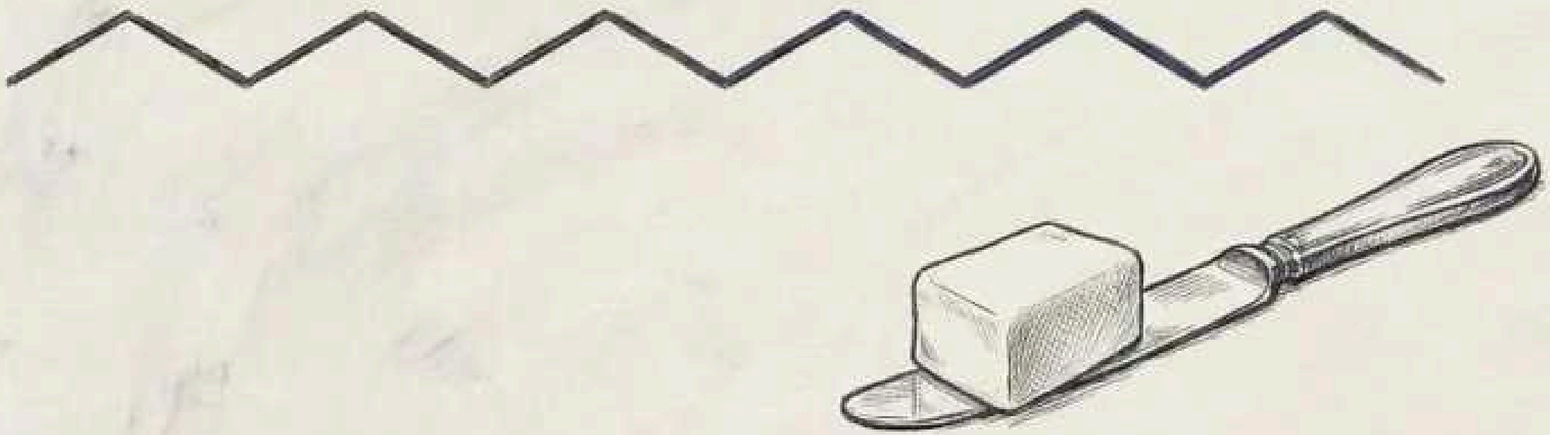
Carries fat-soluble Vitamins A, D, E, and K.



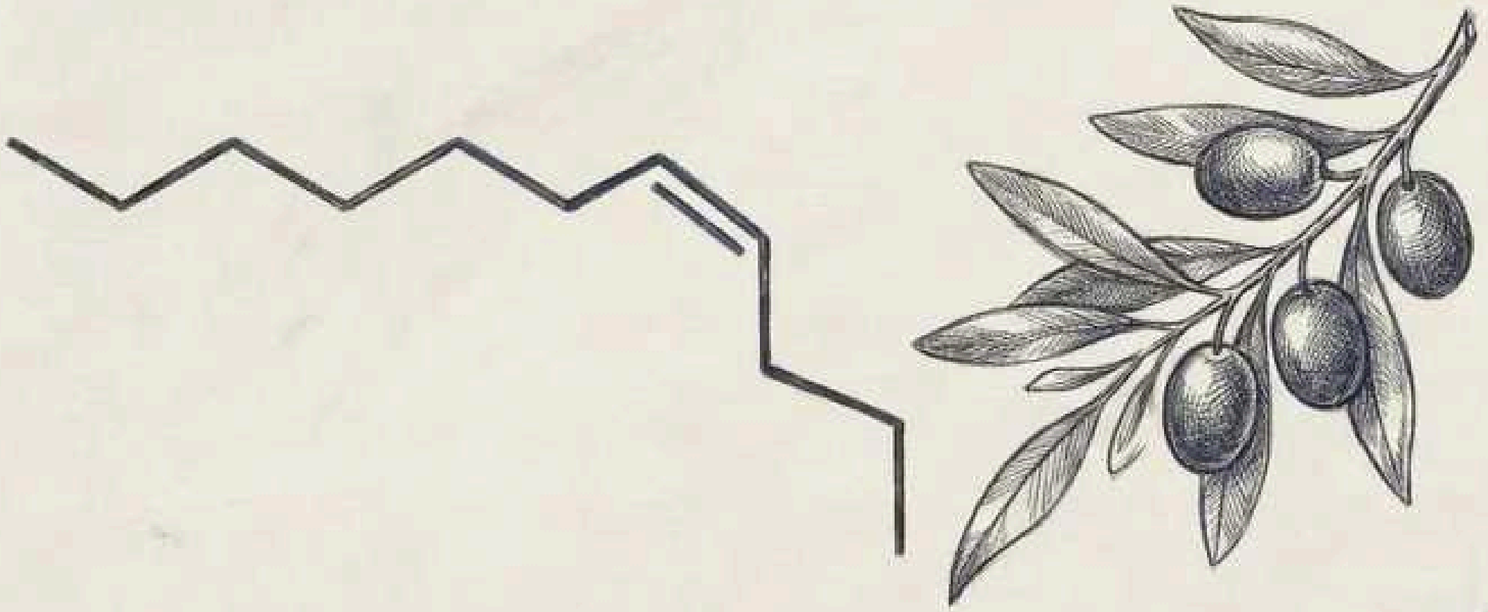
Essential Fatty Acids:

Linoleic Acid & Alpha-linolenic Acid. A diet with too little fat is actively unhealthy.

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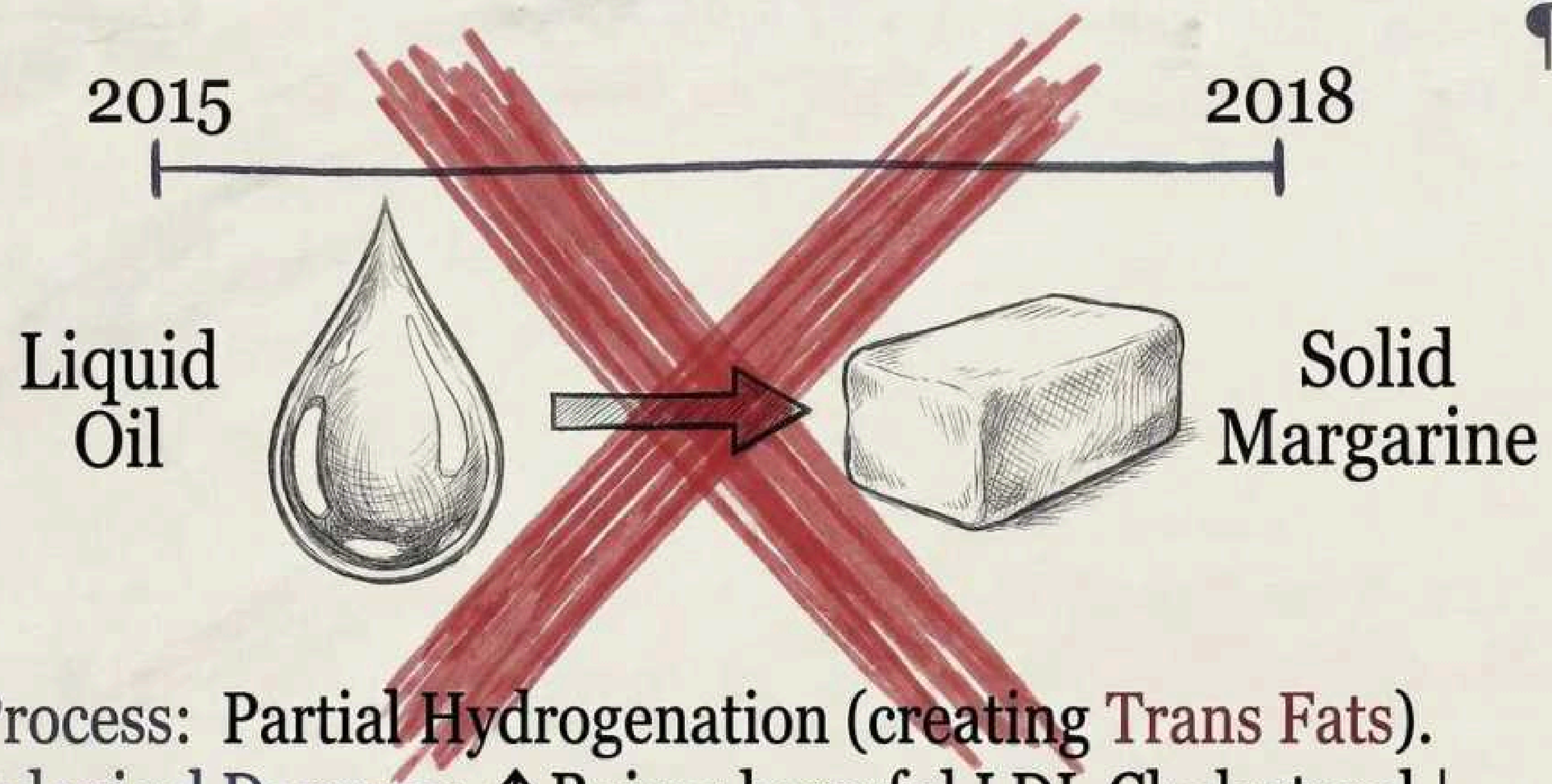


Saturated Fats:
No double bonds
-> Packs tightly ->
Solid at room temp
(Butter, meat fat).



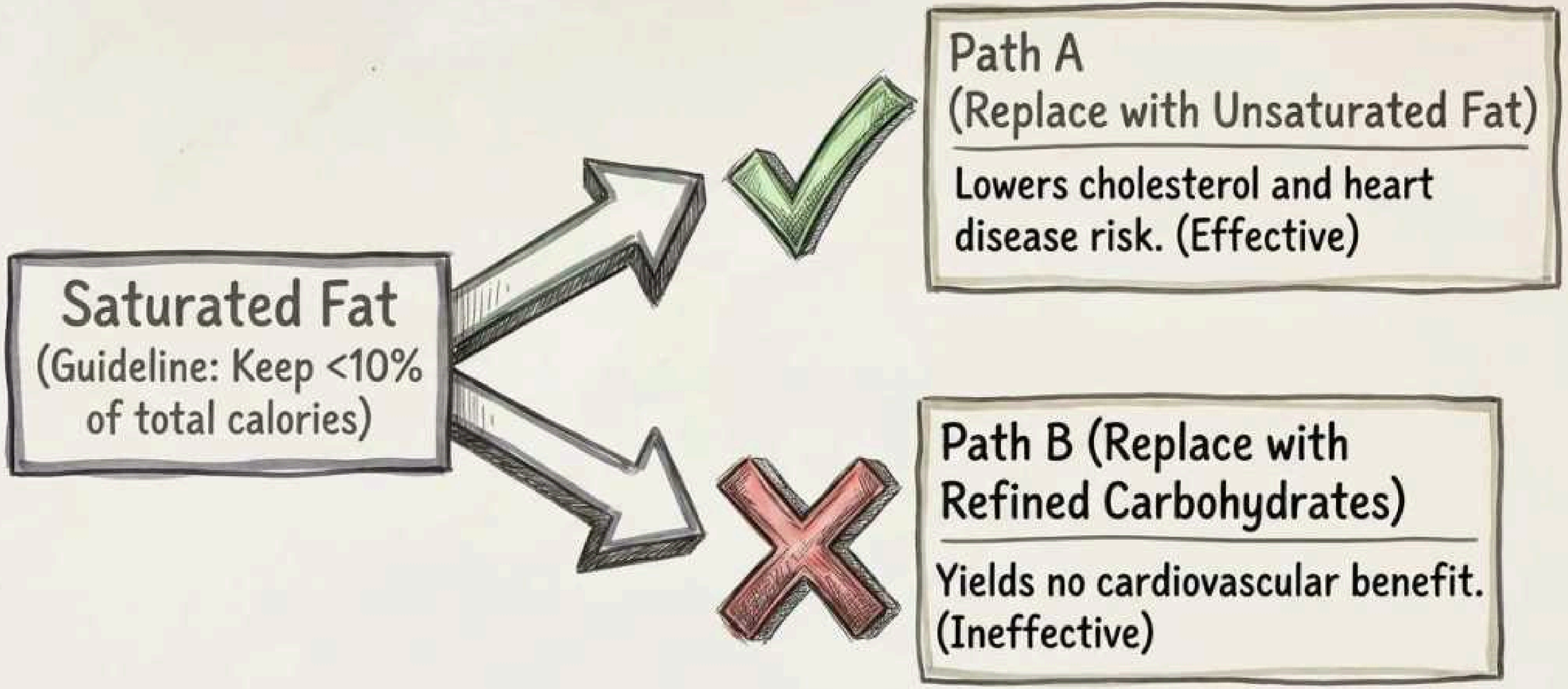
Unsaturated Fats:
Contains double bonds
-> Kinked/Loose -> Liquid
at room temp (Olive oil).
Includes Mono- and
Polyunsaturated types.

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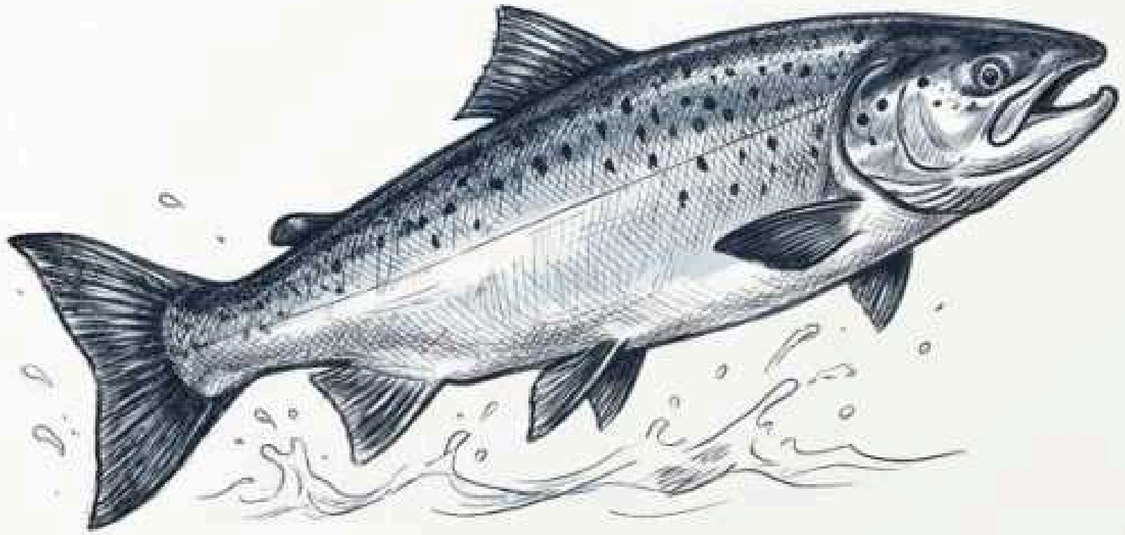
- The Process: Partial Hydrogenation (creating Trans Fats).
- Physiological Damage: ↑ Raises harmful LDL Cholesterol | ↓ Lowers protective HDL Cholesterol.
- Regulatory Action: Deemed "not generally recognized as safe" by the US in 2015; phased out by 2018 due to strong evidence of harm.

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Takeaway: Substitution source dictates the health outcome.

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Omega-3s: A specific family of polyunsaturated fats.

Whole Food Source:

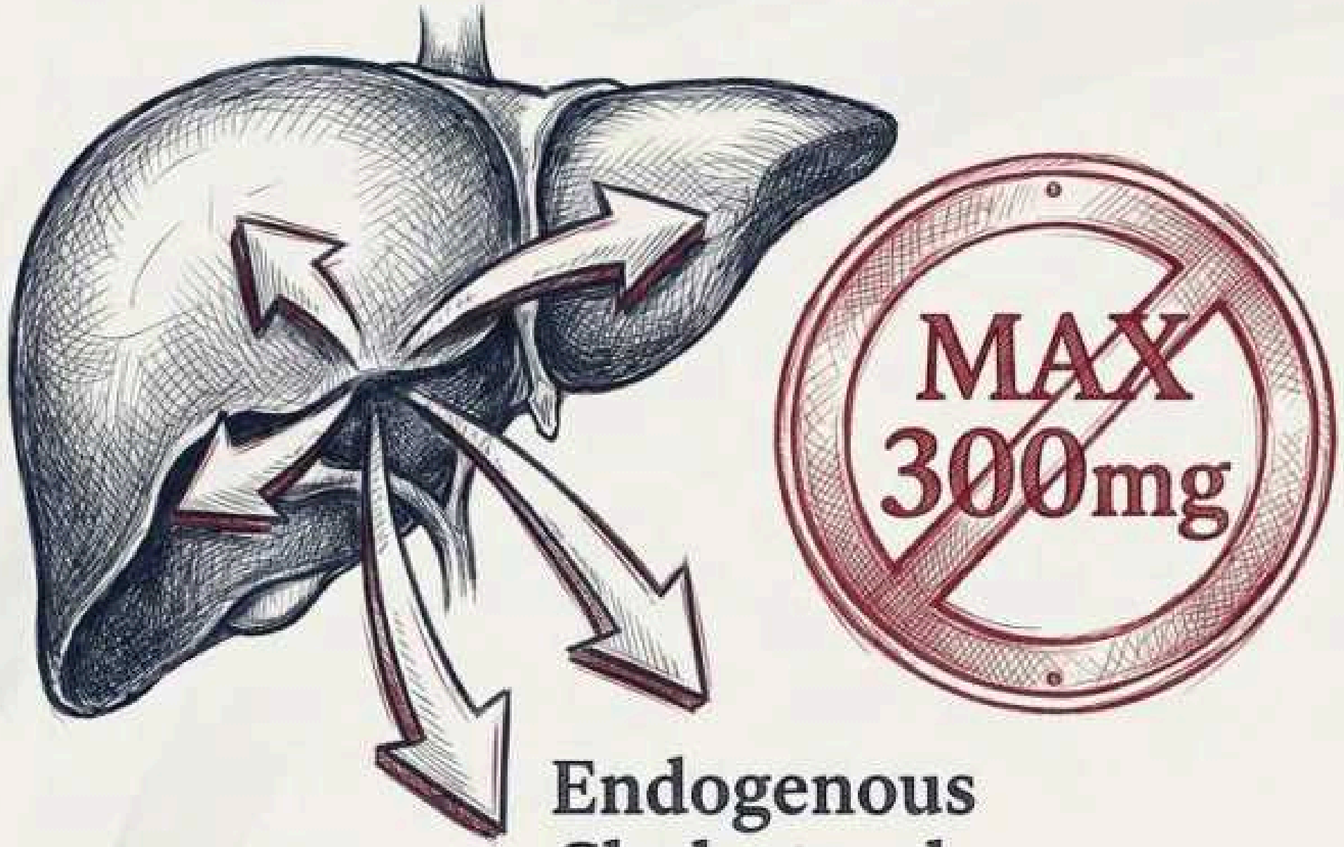
Fatty fish (salmon, sardines, mackerel) eaten 1-2x/week is strongly linked to lower heart disease risk.

Pharmacy Source:

Fish oil capsule trials in healthy populations remain unconvincing.

Conclusion: Food ≠ Pills.

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Endogenous Cholesterol

The Biology:

The human liver manufactures the vast majority of blood cholesterol.

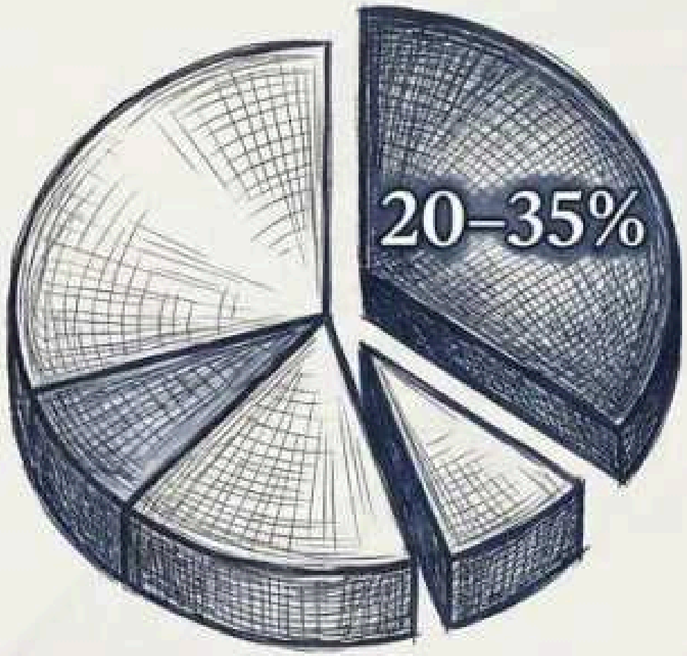
The Policy Shift:

The strict 300mg/day dietary limit (which historically vilified eggs) was officially dropped in 2015.

The Evidence:

Dietary cholesterol has only a weak link to blood cholesterol levels. Dietary advice evolves as evidence improves.

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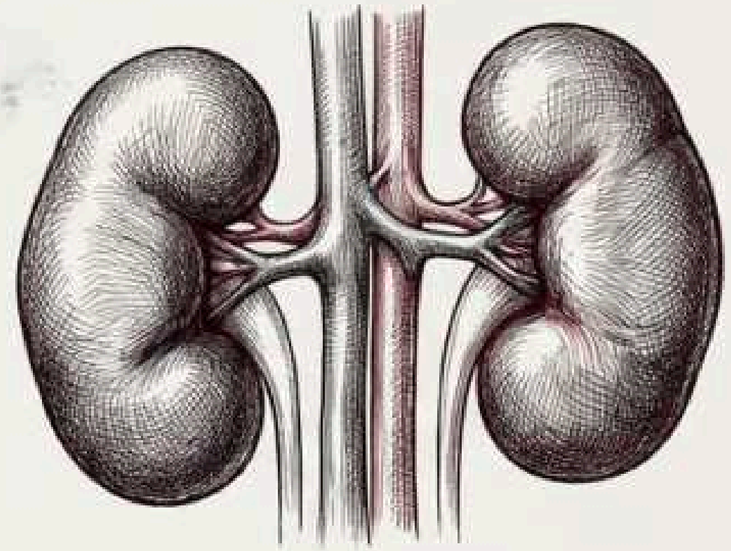
Caloric Target Range:
20–35% of total daily calories.

Promote (Sources > Percentages):
Vegetable oils, nuts, seeds, avocados, and fish.

Limit:
Processed meats and heavily fried foods.

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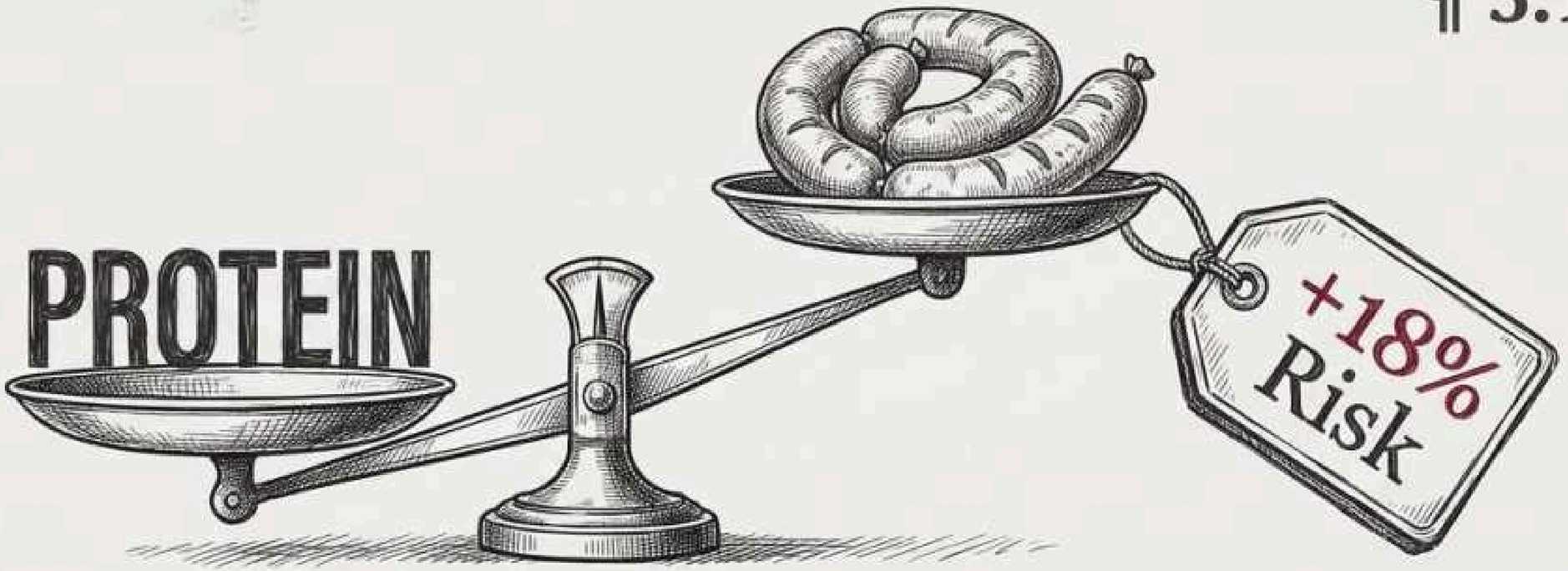


The Utility: Protein shakes offer convenience, but they are not magic. Ordinary food supplies enough for most people.

The Risk: Extremely high protein intakes over long periods require caution, specifically concerning kidney function in vulnerable individuals.

The Rule: Personal medical questions belong with a healthcare professional.

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The Benefit:

Protein is the most filling macronutrient, aiding in calorie satisfaction.

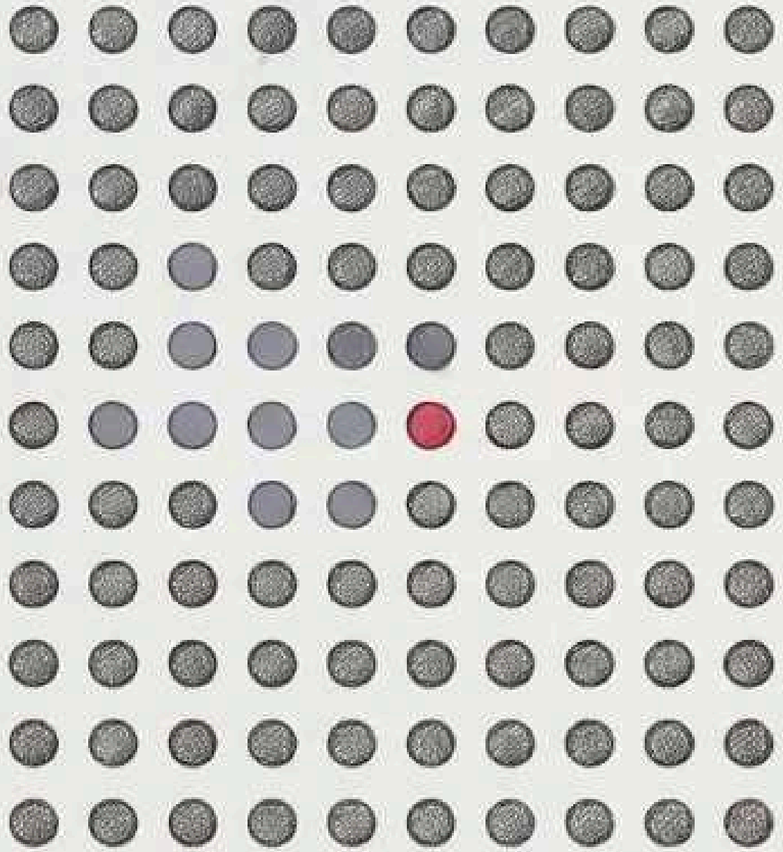
The Hazard (WHO 2015 Classification):

- Processed Meat (bacon, sausage) = Carcinogenic.
- Red Meat = Probably carcinogenic.

The Statistic:

+18% higher relative risk of bowel cancer for each 50g of processed meat eaten daily.

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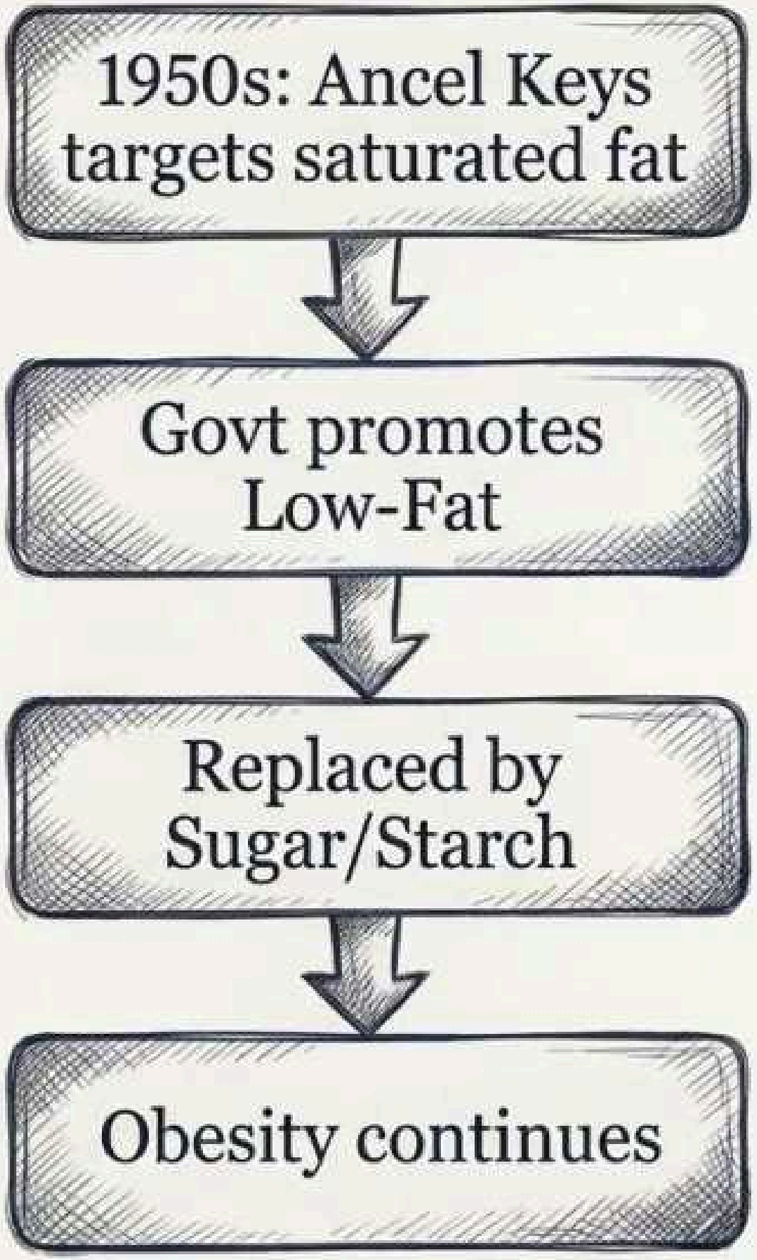
Relative Risk (+18%):
Sounds mathematically massive in headlines.

Absolute Risk (The True Impact):
5% Base Lifetime Risk x 1.18 = 5.9%
(Rounds to 6%)

The Reality:
A 1% absolute increase.
It is real, but modest.

Action: Reduce rather than eliminate.
Substitute red meat with beans, nuts, or fish to support longevity.

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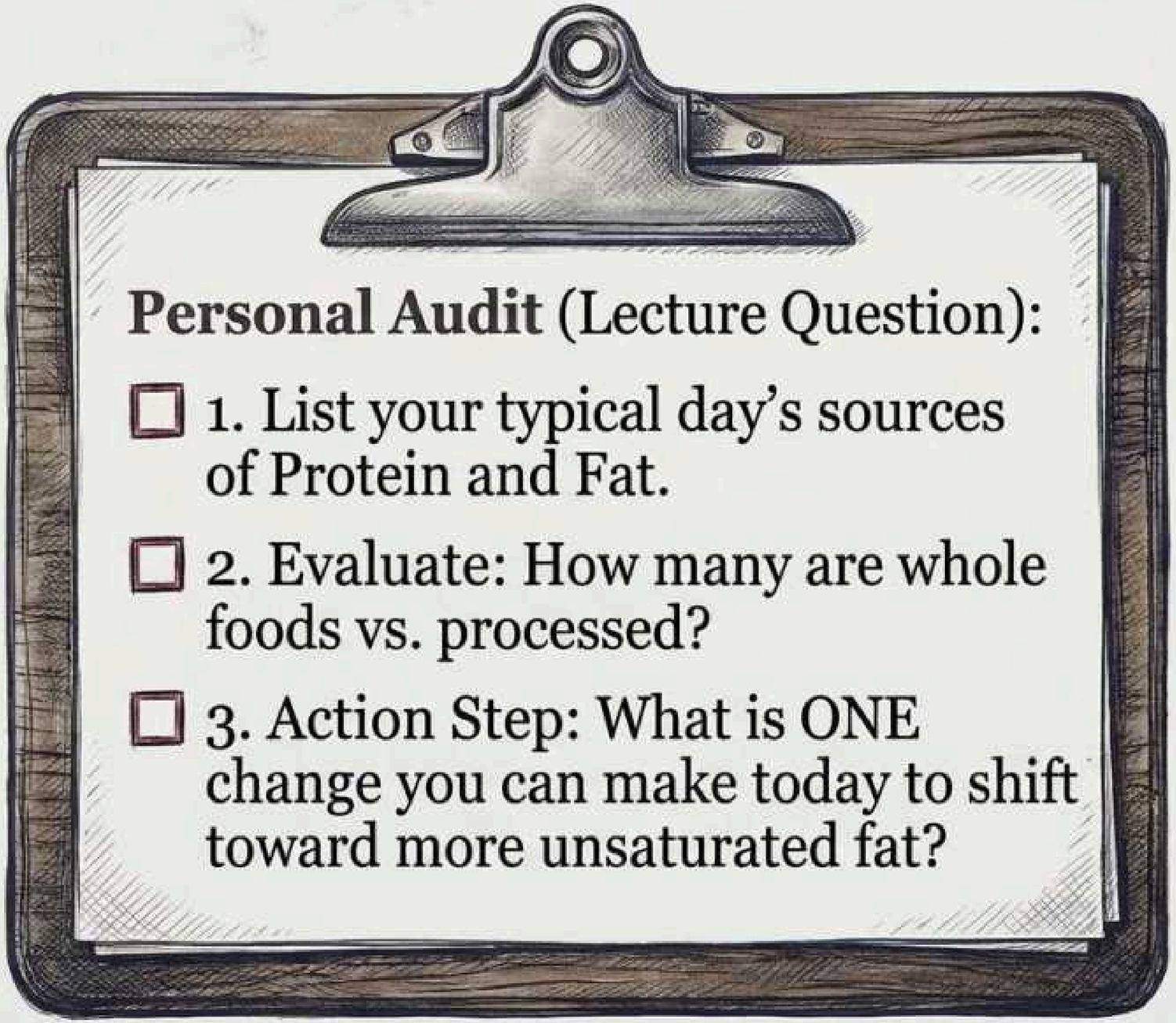


A Lesson in Humility:
Demonizing all fat led to high-sugar and refined-starch compensations.

The Correction:
High-fat whole foods (like nuts) improve heart health without causing weight gain.

Final Mantra:
Quality beats quantity.

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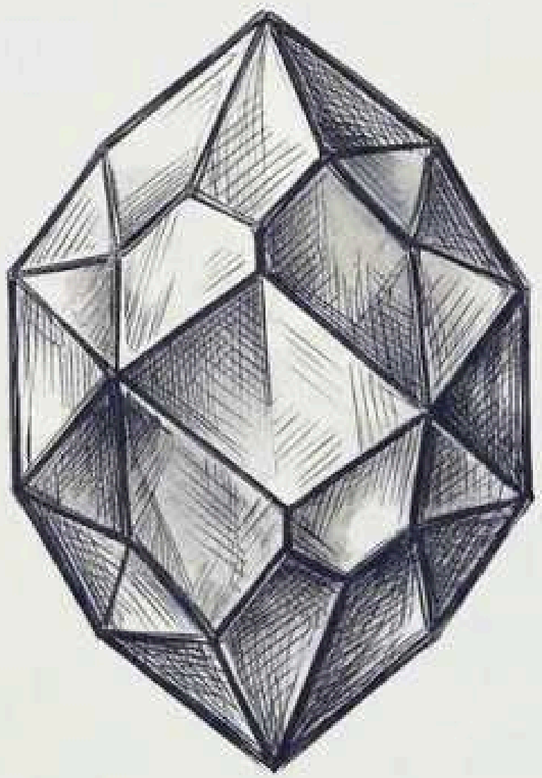


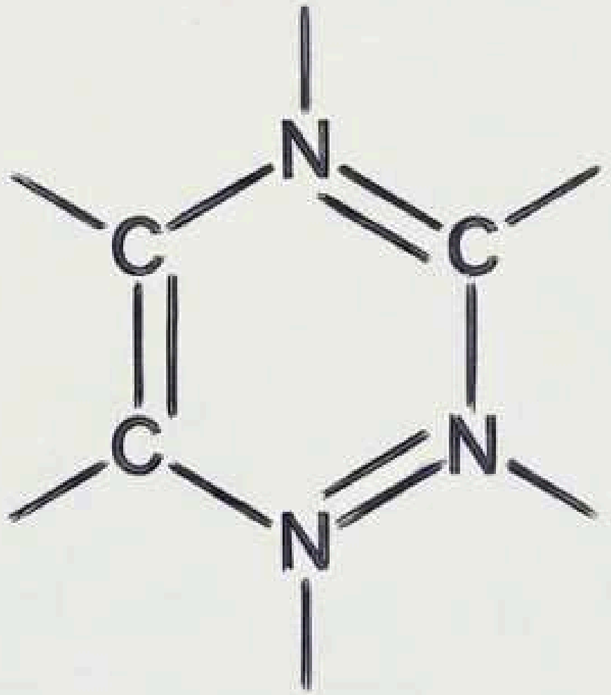
Personal Audit (Lecture Question):

- ☐ 1. List your typical day's sources of Protein and Fat.
- ☐ 2. Evaluate: How many are whole foods vs. processed?
- ☐ 3. Action Step: What is ONE change you can make today to shift toward more unsaturated fat?

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Looking Ahead to Lecture 4:

The Micronutrients.

Exploring the vitamins, minerals, and the water that makes up most of the human body.

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