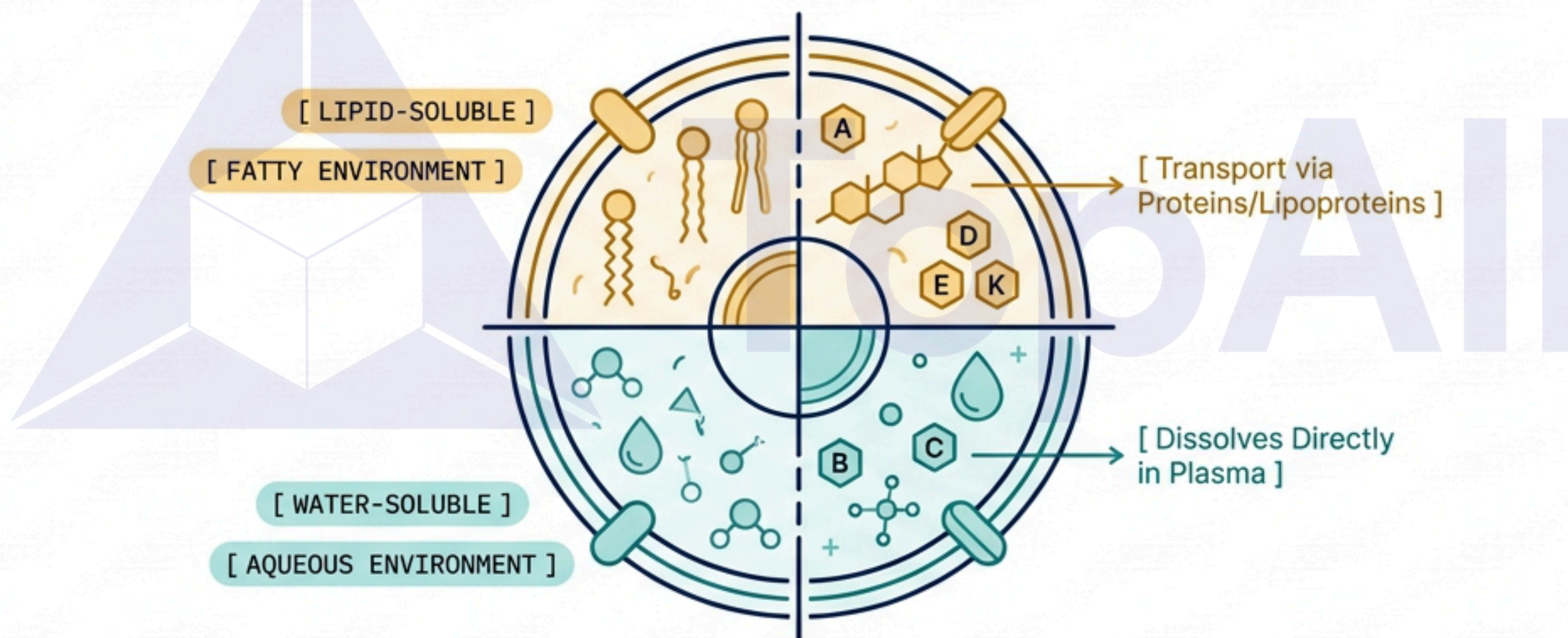


## 10.4.1 Classification of Vitamins

Understanding the chemical dichotomy of essential organic compounds



[ Exam-Smart Synthesis ]

[ Table 10.3 Data Included ]

## CHEMICAL CLASSIFICATION

# Fat-Soluble Vitamins

Vitamins that are soluble in fats and oils, but completely insoluble in water.

### Chemical Nature

Hydrophobic molecules.

### Biological Handling

Absorbed through the intestinal tract with the help of dietary lipids (fats).

[ Vit A ]

Retinol equivalents

[ Vit D ]

Calciferols

[ Vit E ]

Tocopherols

[ Vit K ]

Phylloquinones

Because they dissolve in lipids, their biological handling is entirely dictated by the body's fat absorption and storage mechanisms.

## CHEMICAL CLASSIFICATION

# Water-Soluble Vitamins

Vitamins that dissolve readily in aqueous environments.

### Chemical Nature

Hydrophilic molecules.

### Biological Handling

Absorbed directly into the bloodstream during digestion.

### [ B-Complex Group ]

Includes B1 (Thiamine), B2 (Riboflavin), B6 (Pyridoxine), B12, and others. Functions primarily as coenzymes in cellular metabolism.

### [ Vit C ]

Ascorbic Acid. Crucial for tissue repair and enzymatic production of certain neurotransmitters.

Must be supplied regularly in the diet because the body naturally clears excess water-soluble compounds.



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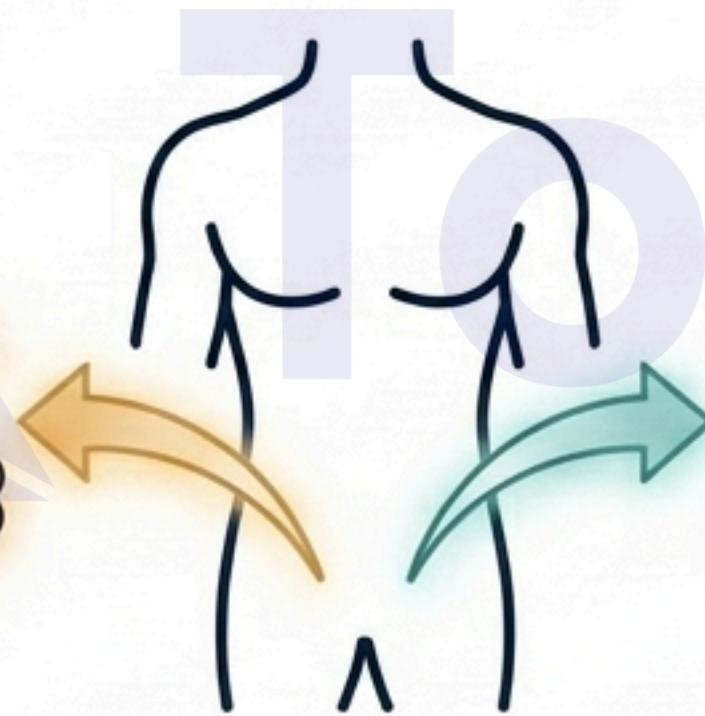
# Storage vs. Excretion

## Fat-Soluble

- Mechanism: Stored long-term.
- Locations: Liver and Adipose (fat-storing) tissues.
- Dietary Need: Periodic intake is sufficient.

### Concept chips

- Clinical Risk: Excess can be harmful (hypervitaminosis) due to toxic buildup in tissues.



## Water-Soluble

- Mechanism: Readily excreted.
- Locations: Flushed out via urine through the kidneys.
- Dietary Need: Requires regular, continuous dietary supply.



### [ EXCEPTION ALERT: ]

Vitamin B12 is the *\*only\** water-soluble vitamin stored in the body (liver).

# Key Sources of Vitamins



## Plant-Based & Oils

Green leafy veggies, carrots, amla, citrus: [ Vit A ] [ Vit C ] [ Vit K ]  
Vegetable / Wheat germ / Sunflower oils: [ Vit E ]  
Cereals, grams & yeast: [ B1 ] [ B6 ]



## Animal-Derived

Milk, butter, curd: [ Vit A ] [ B1 ] [ B2 ] [ B6 ] [ B12 ]  
Liver, meat, fish, egg yolk/white: [ Vit A ] [ B2 ] [ B6 ] [ B12 ] [ Vit D ]



## Environmental & Endogenous

**Sunlight:** Exposure to UV triggers biological synthesis of [ Vit D ] in the skin.

(Note: Gut bacteria can also synthesize certain vitamins internally).

# Deficiency Diseases

## Blood & Vessels

**Pernicious Anaemia:** RBC deficient in haemoglobin.

[ Vit B12 ]

**Scurvy:** Bleeding gums, tissue weakness.

[ Vit C ]

**Increased Clotting Time:** Bleeding risks.

[ Vit K ]

**RBC Fragility:** Increased cellular breakdown.

[ Vit E ]

## Bones & Muscles

**Rickets:** Bone deformities in children.

[ Vit D ]

**Osteomalacia:** Soft bones and joint pain in adults.

[ Vit D ]

**Muscular Weakness:**

[ Vit E ]

**Convulsions:** Neuromuscular spasms.

[ Vit B6 ]

## Epithelium, Vision & Digestion

**Xerophthalmia & Night Blindness:** Hardening of eye cornea.

[ Vit A ]

**Cheilosis:** Fissuring at mouth corners/lips, skin burning.

[ Vit B2 ]

**Beri Beri:** Loss of appetite, retarded growth.

[ Vit B1 ]

# Solubility Determines Handling in the Body

## Step 1: Chemical Property

Is the molecule soluble in water or fat?



## Step 2: Biological Handling

Determines if the body stores it (Liver/Adipose) or excretes it (Urine).

## Step 3: Dietary Imperative

Determines if you must consume it every day (Water) or periodically (Fat).

Vitamins are defined not by a shared structure (the original 'amine' group was a misnomer), but by their shared biological necessity. Categorizing them into **[A, D, E, K]** (Fat) and **[B, C]** (Water) is the master key to understanding their entire physiology.



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