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***Q1: How Fat soluble vitamins are absorbed by the body.***

***Ans:- Vitamins Absorbed In The Body?***

THE PROCESS BY WHICH VITAMINS ARE ABSORBED IN THE BODY IS AS IMPORTANT AS THE VITAMINS THEMSELVES.

For those of us leading (or attempting to lead) healthy lives, we try to eat well-balanced diets and perhaps top up vitamin supplements to get all of the vital nutrients our bodies need to function properly. However, if those vitamins are not properly absorbed by our bodies, we get little or no benefit from our healthy efforts. So how exactly does absorption happen in the body

After food is chewed and swallowed, it travels into your stomach where hydrochloric acid and enzymes break down

carbohydrates, fats and proteins. From there, the digestive system extracts the vitamins and minerals in the digested food, where they are absorbed into the bloodstream. These nutrients are delivered to the cells, which then absorb the ones they require.

Vitamin intake, however, is only part of the story. Some nutrients are needed to help your body absorb other nutrients more efficiently or to transport them throughout the body. For example, vitamin C helps in the absorption of iron and chromium. Copper is also needed by the body to absorb the iron it needs and keep its cells alive. Without vitamins D and K, calcium will not be absorbed. Calcium and iron prevent each other's absorption, and thus should not be taken at the same time. The same is true for magnesium and fluoride.

There are other factors that can aid or obstruct the absorption process. If your body is lacking a certain nutrient, it will be more aggressively absorbed from the food source. Those who exercise should consume meals a few hours before working out, because the body may not be focused on digestion and absorption when it's diverting nutrients to muscles. Stress negatively affects nutrient absorption, as do alcohol and caffeine. (The latter can reduce absorption by up to 80 %!)

The types of foods which nutrients are coming from also have a bearing on how readily they're absorbed. For instance, fat-soluble vitamins A, D, E and K will be better absorbed when consumed in a meal that contains fat. For this reason, people on low-fat diets may experience a decline in absorption of fat-soluble vitamins.

By following the above nutrient absorption guidelines, your body will get more of the vitamins and minerals it needs to keep you looking and feeling young, regardless of your age.

***Q2:Classify the BLOOR classification of lipids, discuss fatty acid and its types***

***Ans:- BLOOR CLASSIFICATION OF LIPIDS:-***

The, Bloor in 1920 classified lipoids into three groups, simple lipoids (fats and waxes), compound lipoids (phospholipids and glycolipids) and derived lipoids (fatty acids, alcohols and sterols).

***Simple Lipids:-***

Esters of fatty acids with various alcohols.

**Fats:** Esters of fatty acids with glycerol. Oils are fats in the liquid state

**Waxes:** Esters of fatty acids with higher molecular weight monohydric alcohol.

***Compound lipids:***

Esters of fatty acids containing groups in addition to alcohol and a fatty acid.

**Phospholipids:** These are lipids containing, in addition to fatty acids and alcohol, a phosphoric acid residue. They frequently have nitrogen-containing bases and other substituents, eg, in glycerophospholipids the alcohol is glycerol and in sphingophospholipids the alcohol is sphingosine.

**Glycolipids** (glycosphingolipids): Lipids containing a fatty acid, **sphingosine**, and carbohydrate.

Other complex lipids: Lipids such as sulfolipids and amino lipids. **Lipoproteins** may also be placed in this category.

**Derived Lipids:-**

These include fatty acids, glycerol, steroids, other alcohols, fatty aldehydes, and ketone bodies, hydrocarbons, lipid-soluble vitamins, and hormones. Because they are uncharged, acylglycerols (glycerides), cholesterol, and cholesteryl esters are termed neutral lipids. These compounds are produced by the hydrolysis of simple and complex lipids.

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### ❖ Fatty acid and it's type:

#### Fatty Acids

Fatty acids are carboxylic acids (or organic acid), usually with long aliphatic tails (long chains), either unsaturated or saturated.

#### ❖ *Saturated fatty acids*

Lack of carbon-carbon double bonds indicates that the fatty acid is saturated. The saturated fatty acids have higher melting points compared to unsaturated acids of the corresponding size due to their ability to pack their molecules together thus leading to a straight rod-like shape.

#### ❖ *Unsaturated fatty acids*

Unsaturated fatty acid is indicated when a fatty acid has more than one double bond.

“Often, naturally occurring fatty acids possess an even number of carbon atoms and are unbranched.”

On the other hand, unsaturated fatty acids contain a cis-double bond(s) which create a structural kink that disables them to group their molecules in straight rod-like shape.

**Q3: Write down the biological significance of any 5 essential minerals.**

**Ans:- 1.Sodium:-**

**Functions:-**

Needed for proper fluid balance, nerve transmission, and muscle contraction

**Sources:-**

Table salt, soy sauce; large amounts in processed foods; small amounts in milk, breads, vegetables, and unprocessed meats

**2. Chloride:**

**Functions:**

Needed for proper fluid balance, stomach acid

**Sources:**

Table salt, soy sauce; large amounts in processed foods; small amounts in milk, meats, breads, and vegetables

### **3.Potassium**

#### **Functions:**

Needed for proper fluid balance, nerve transmission, and muscle contraction

#### **Sources:**

Meats, milk, fresh fruits and vegetables, whole grains, legumes

### **4.Calcium**

#### **Functions:**

Important for healthy bones and teeth; helps muscles relax and contract; important in nerve functioning, blood clotting, blood pressure regulation, immune system health

#### **Sources:**

Milk and milk products; canned fish with bones (salmon, sardines); fortified tofu and fortified soy milk; greens (broccoli, mustard greens); legumes

### **5.Phosphorus:**

#### **Functions:**

Important for healthy bones and teeth; found in every cell; part of the system that maintains acid-base balance

#### **Sources:**

Meat, fish, poultry, eggs, milk, processed foods (including soda pop)

#### **Q4: Discuss digestion and absorption of lipids.**

#### **Ans:- Digestion and Absorption of Lipids**

Lipids are large molecules and generally are not water-soluble. Like carbohydrates and protein, lipids are broken into small components for absorption. Since most of our digestive enzymes are water-based, how does the body break down fat and make it available for the various functions it must perform in the human body.

#### **From the Mouth to the Stomach**

The first step in the digestion of triglycerides and phospholipids begins in the mouth as lipids encounter saliva. Next, the physical action of chewing coupled with the action of emulsifiers enables the digestive enzymes to do their tasks. The enzyme lingual lipase, along with a small amount of phospholipid as an emulsifier, initiates the process of digestion. These actions cause the fats to become more accessible to the digestive enzymes. As a result, the fats become tiny droplets and separate from the watery components.



## **Going to the Bloodstream**

As stomach contents enter the small intestine, the digestive system sets out to manage a small hurdle, namely, to combine the separated fats with its own watery fluids. The solution to this hurdle is bile. Bile contains bile salts, lecithin, and substances derived from cholesterol so it acts as an emulsifier. It attracts and holds onto fat while it is simultaneously attracted to and held on to by water. Emulsification increases the surface area of lipids over a thousand-fold, making them more accessible to the digestive enzymes.

**Q5. Briefly explain the function, source and deficiency symptoms of following vitamins.**

**Ans 1. RETINOL:**

Function:

Retinoids are involved in diverse biological activities including cellular growth, cellular cohesion, immunomodulatory effects, and anti-tumors functions. Vitamin A and its derivatives, particularly retinol, are substances slowing the aging process most effectively.

Source: Beef Liver — 713% DV per serving. ...

- Lamb Liver — 236% DV per serving. ...
- Liver Sausage — 166% DV per serving. ...
- Cod Liver Oil — 150% DV per serving. ...
- King Mackerel — 43% DV per serving. ...
- Salmon — 25% DV per serving.

**Deficiency:** Deficiency impairs immunity and hematopoiesis and causes rashes and typical ocular effects (eg, xerophthalmia, night blindness). Diagnosis is based on typical ocular findings and low vitamin A levels.

## **2. THIAMIN:**

**Function:** Thiamin (vitamin B1) helps the body's cells change carbohydrates into energy. The main role of carbohydrates is to provide energy for the body, especially the brain and nervous system. Thiamin also plays a role in muscle contraction and conduction of nerve signals. Thiamin is essential for the metabolism of pyruvate.

**Source:** Food sources of thiamin include whole grains, meat, and fish. Breads, cereals, and infant formulas in the United States and many other countries are fortified with thiamin. The most common sources of thiamin in the U.S. diet are cereals and bread.

**Deficiency:** Thiamine deficiency is a medical condition of low levels of thiamine (vitamin B1). A severe and chronic form is

known as beriberi. There are two main types in adults: wet beriberi, and dry beriberi. Wet beriberi affects the cardiovascular system resulting in a fast heart rate, shortness of breath, and leg swelling.

### **3. Pyridoxine:**

**Function:** Vitamin B6 plays an important role in the body. It is needed to maintain the health of nerves, skin, and red blood cells. Pyridoxine has been used to prevent or treat a certain nerve disorder (peripheral neuropathy) caused by certain medications (such as isoniazid).

**Source:** The richest sources of vitamin B6 include fish, beef liver and other organ meats, potatoes and other starchy vegetables, and fruit (other than citrus). In the United States, adults obtain most of their dietary vitamin B6 from fortified cereals, beef, poultry, starchy vegetables, and some non-citrus fruits

**Deficiency:** Vitamin B6 deficiency is usually caused by pyridoxine-inactivating drugs (eg, isoniazid), protein-energy undernutrition, malabsorption, alcoholism, or excessive loss. Deficiency can cause peripheral neuropathy, seborrheic dermatitis, glossitis, and cheilosis, and, in adults, depression, confusion, and seizures.