

Structure of Ileum:

The ileum is adapted to the function of absorbing the products of digestion.

The **wall of the ileum is folded and possesses projections (villi)**. They have **thin walls lined with epithelial cells** on the other side of which is a **rich network of blood capillaries**. The **villi increase the surface area of the ileum = accelerate rate of absorption**.

Villi are situated at the interface between the lumen (cavity) of the intestines and the blood and other tissues in the body.

Properties increase efficiency of absorption by:

- **Increasing the surface area for diffusion**
- **Thin walled = reduced diffusion distance**
- **Contain muscle so they are able to move = movement mixes contents of the ileum which helps maintain a diffusion gradient**. This ensures that as products of digestion are absorbed from the food adjacent to the villi, new material rich in the products of digestion replaces it.
- **Well supplied with blood vessels = blood can carry away absorbed molecules and hence maintain diffusion gradient.**
- **Epithelial cells possess microvilli** (projections of the cell-surface membrane) that **further increase surface area**.

Absorption of amino acids and monosaccharides:

The method of absorbing amino acids and monosaccharides is the same, namely through co-transport and diffusion.

Absorption of triglycerides:

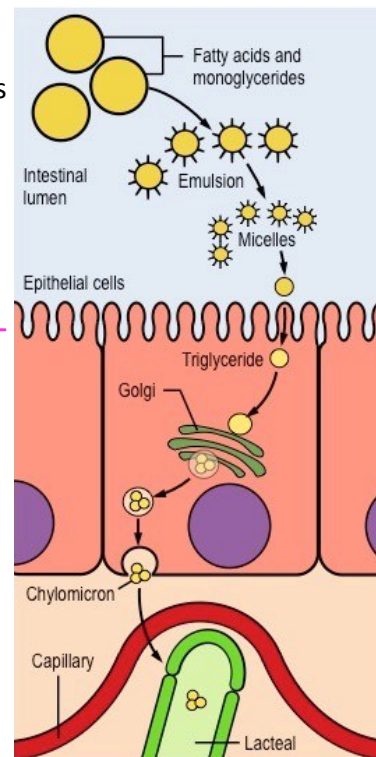
Once formed during digestion, **monoglycerides and fatty acids remain in association with the bile salts that initially emulsified the lipid droplets. The structures formed are micelles**.

Through the movement of material within the lumen of the ileum, the **micelles come into contact with the epithelial cells lining the villi of the ileum**.

Here, **micelles break down, releasing the monoglycerides and fatty acids**. As these are non-polar molecules, they easily diffuse across the cell-surface membrane into the epithelial cells.

Once inside, these are transported to the endoplasmic reticulum where they are recombined to form triglycerides. **Starting in the ER and continuing in the Golgi apparatus, the triglycerides associate with cholesterol and lipoproteins to form structures called chylomicrons** (special particles adapted for transport of lipids).

Chylomicrons move out of the epithelial cells by exocytosis. They enter lymphatic capillaries called lacteals that are found at the **centre of each villus**. From here, **chylomicrons pass (via lymphatic vessels) into the blood stream**. The **triglycerides in the chylomicrons are hydrolysed by an enzyme in the endothelial cells of blood capillaries from where they diffuse into cells**.



Absorption of the products of digestion

Absorption of fatty acids:

One end of the bile salt molecule is soluble in fat (lipophilic) but not in water (hydrophobic). The other end is soluble in water (hydrophilic) but not in fat (lipophobic). Bile salts arrange themselves with their lipophilic ends in fat droplets with their lipophobic ends sticking out.

In this way they prevent fat droplets from sticking to each other and forming large droplets leaving only tiny ones (micelles). In this form fatty acids reach the epithelial cells of the ileum where they break down, releasing fatty acids for absorption.