

TOPIC 6.1: ABSORPTION

Purpose of Absorption

Absorption involves the movement of fluids or dissolved substances (such as nutrients) across a cellular membrane

- The absorbed components then undergo *assimilation* within the cell in order to become fluid or solid parts of an organism

Nutrient absorption occurs within the small intestine, while water and mineral ions are absorbed within the large intestine

Membrane Transport Mechanisms

Secondary Active Transport

- Glucose and amino acids are co-transported across the epithelial membrane with sodium ions (Na^+)

Facilitated Diffusion

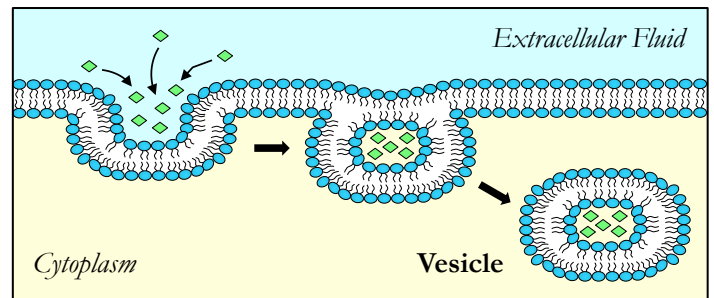
- Certain monosaccharides, vitamins and some minerals may be transported by epithelial channel proteins

Simple Diffusion

- Hydrophobic materials (e.g. lipids) are capable of freely diffusing across the epithelial membrane

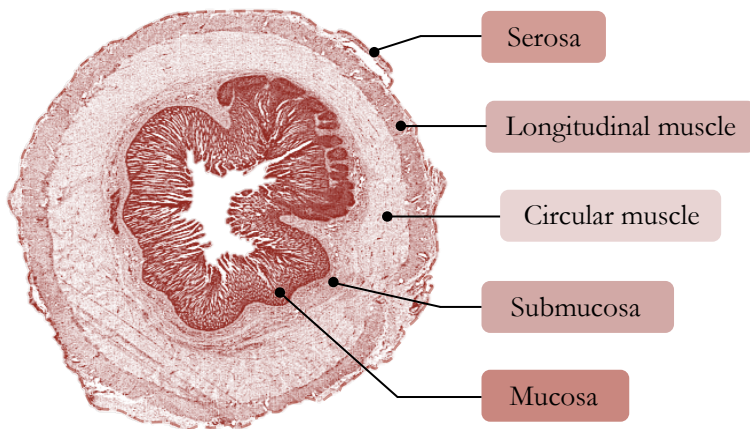
Endocytosis

- Dissolved materials may be rapidly absorbed *en masse* via the process of pinocytosis (cell 'drinking')

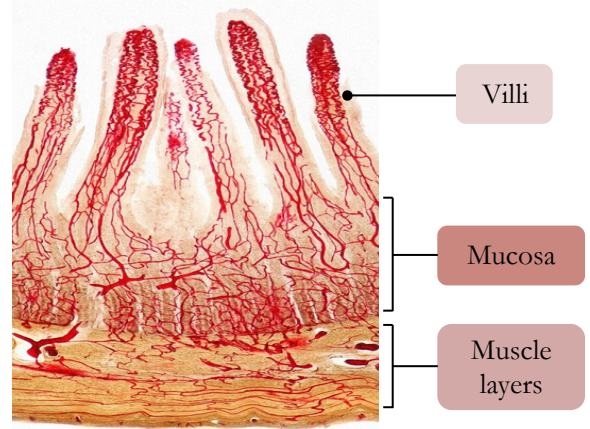


Small Intestine Structure

Transverse Cross-Section



Longitudinal Cross-Section



Villi

Villi are finger-like mucosal projections that increase the surface area of epithelium over which absorption is carried out

Key features of villi include:

- M**icrovilli (↑ SA:Vol)
- R**ich blood network
- S**ingle layer epithelium
- L**acteals (absorb lipids)
- I**ntestinal crypts (exocrine)
- M**embrane proteins



Modelling Absorption

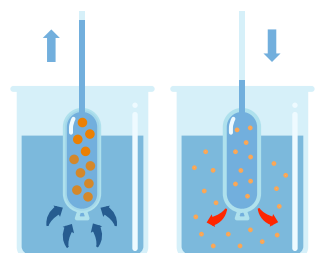
Dialysis tubing can be used to model the size-specific permeability of a membrane

- Large molecules cannot cross (e.g. starch)
- Smaller molecules can cross (e.g. glucose)

If large molecules are digested with enzymes, the absorption of the smaller subunits can then be measured in a number of ways:

- Via a change in fluid / meniscus levels
- Via the presence of specific materials (identified via treatment with a reagent)

Sample Experiment:



Control
Starch in
Water in

Digestion
Maltose exits
Water exits