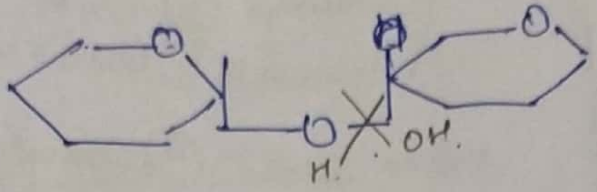
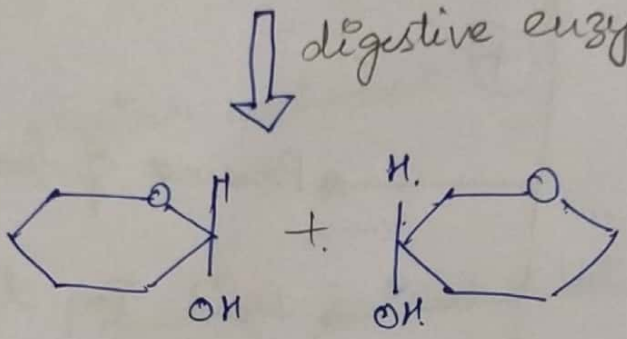
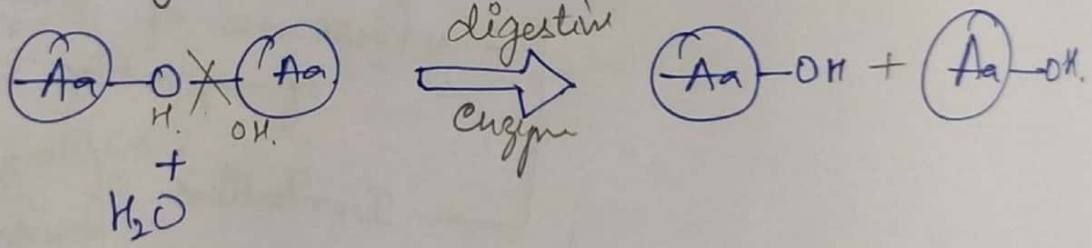
Digestion & Absorption in GIT
(Source - Oxford).

Hydrolysis :- (i) Carbohydrates :-

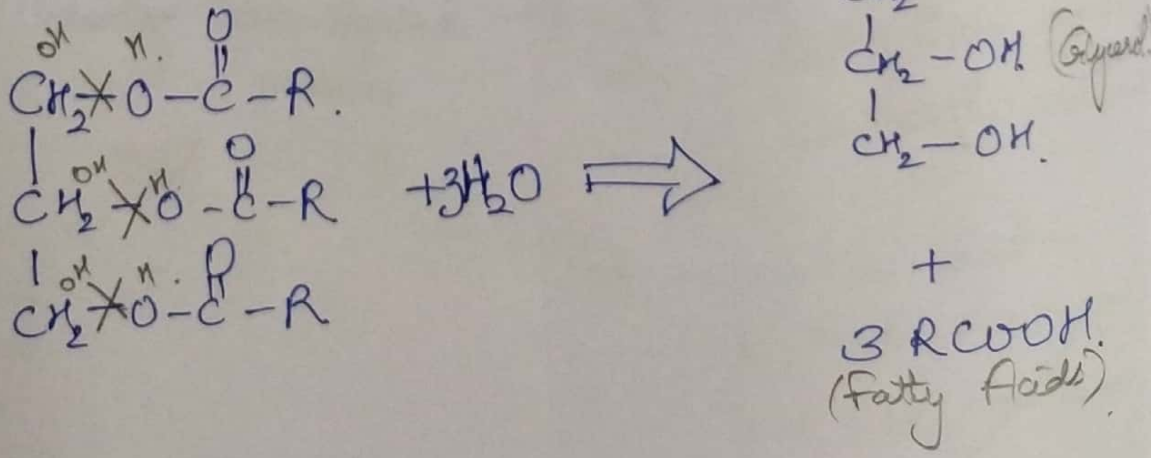




(ii) Proteins :- hydrolysis on dipeptides.



(iii) Fats :-



→ Sucrose (cane sugar)
→ Lactose
→ Starches
→ Others in small amt. like.
① Amylose
② Glycogen
③ dextrins
④ Pectins
⑤ Alcohol
⑥ Lactic acid
⑦ Pyruvic acid

Digestion in Mouth

Starch —Ptyalin (α-amylase), PH = 6.8→ Maltoses & Polymers (3–9 Glucose units)

secreted mainly by parotid gland.

⇒ due to lack of time only 5% of starch is digested.

Digestion in Stomach:–

⇒ digestion by Ptyalin (α-amylase) continues in stomach for nearly 1hr before food & saliva mixes with gastric secretion

⇒ Salivary Amylase is blocked after 1hr at PH < 4.

⇒ But 30% – 40% of Starch is digested before its blocking.

⇒ Pancreatic amylase (more powerful than salivary amylase) digest all starch within 15-30 min in the same manner as that of Ptyalin at duodenum itself.

Intestinal ~~Amylases~~ disaccharidases :- located at Intestinal cell microvilli brush border

↓

Maltose —① Maltase→ 2 Glucose.

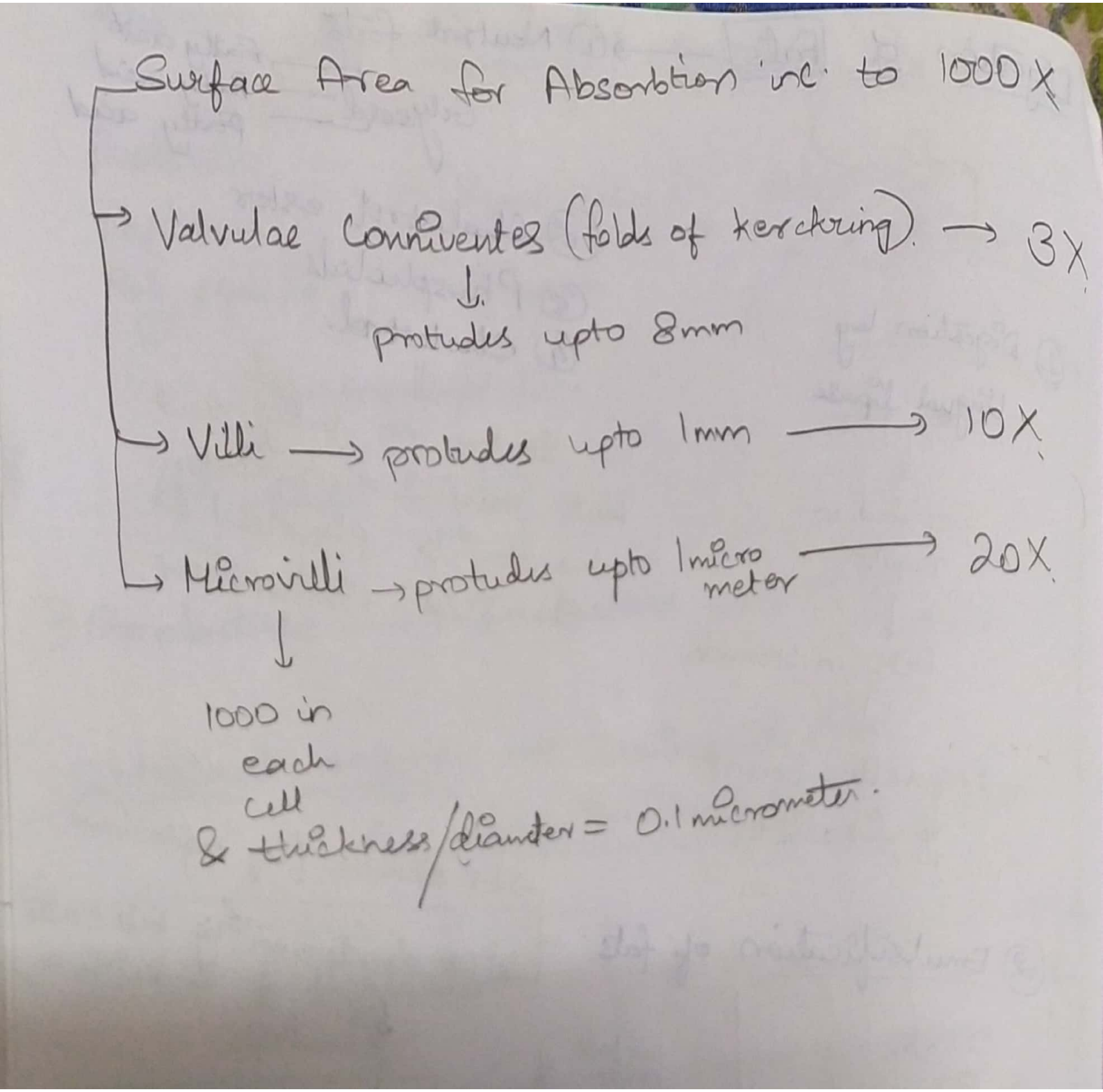
Sucrose —② Sucrase→ Glucose + Fructose

Lactose —③ lactase→ Glucose + Galactose

Glucose polymers —④ dextrinases→ many Glucose units

Final Product :- >80% ⇒ Glucose.

>10% ⇒ Fructose & Galactose



~~First Step from~~ Small Intestine.

Normally.

① Several hundred gm of carbohydrates
② 50-100g fats
③ 50-100g Aa
④ 50-100g ions
⑤ 7-8 L of H_2O

Capacity.

① Several kg of Carbohy
② 500g fats
③ 500-700g proteins
④ >20L H_2O

Absorption of Na^+

⇒ 20-30g secreted
⇒ 5-8g ingested.
⇒ 25-35g absorbed. ($\frac{1}{7}^{th}$ Na^+ present in body)
⇒ 0.5% excreted.

① Na^+/K^+ ATPase ⇒ basal & lateral walls.
$[Na^+]$ inside cell ↓. [50mEq/L]
∴ Passive Na^+ influx by
↳ Na-Glucose co-transp.
↳ Na-Aa. co-transporter
↳ Na^+ channels with Cl^- abs.
↳ Na^+-H^+ exchanger

$[Na^+]$ outside (lumen) = 145mEq/L

Movement of H_2O :-

If chyme diluted — Chyme → Blood.

If hyperosmolic chyme — Blood → Chyme.

H_2O Absorption
- Trans cellular → through cells
- Para-cellular → b/w cells.

↓

due to more ion conc. by Na/k ATPase

→ Aldosterone ↑.

Na⁺ Absorbtion ↑
Cl⁻ Absorbtion ↑
H_2O Absorbtion ↑
} within 1-3 hr

→ Chloride Absorbtion.

At Duodenum Jejunum
↓
follows Na.
to maintain electrical neutrality

At Ileum & Large Intst.
↓
$Cl^- - HCO_3^-$ exchanger.

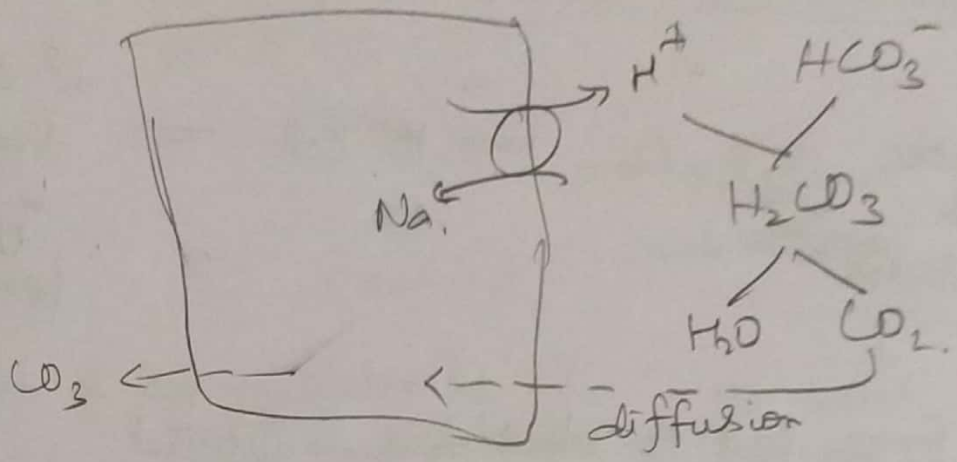
(or)

ACTIVE ABSORBTION OF HCO_3^-

Intestinal Cell

Lumen

Blood



Secretion of HCO_3^- at Ileum & large intestine

$\Rightarrow$ $Cl^- - HCO_3^-$ exchanger.

Absorbtion of Ca^{+2} $\longrightarrow$ Parathyroid hormone

↓ activates

Vit-D

↓

ine. Ca^{+2} absorbtion

Monovalents easily absorbed than bivalents

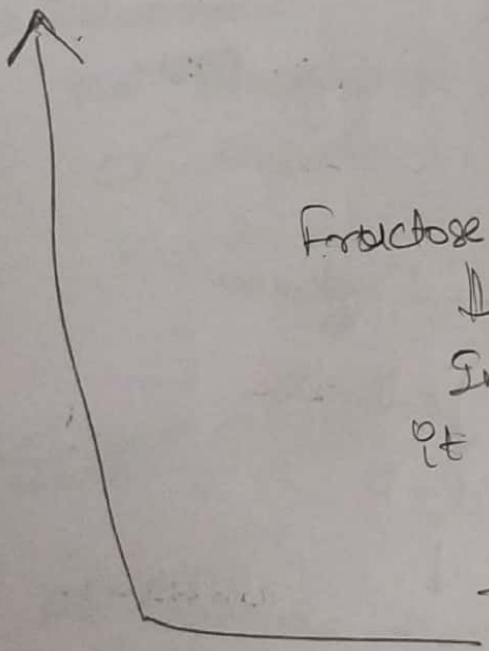
$\therefore Ca^{+2}$ absorbtion is $\frac{1}{50}^{th}$ of Na^{+} absorbtion

Absorbtion of Carbohydrates

Glucose & Galactos ⟹ from lumen to cell ⟹ 2° active transportor by Na (powered by Na/K ATPase)

⇓

From cell to blood ⟹ facilitated diffusion.



Fructose ⟹ from lumen to cell ⟹ facilitated diffusion

⇓

In cell it get phosphorylated

⇓

then converted to glucose