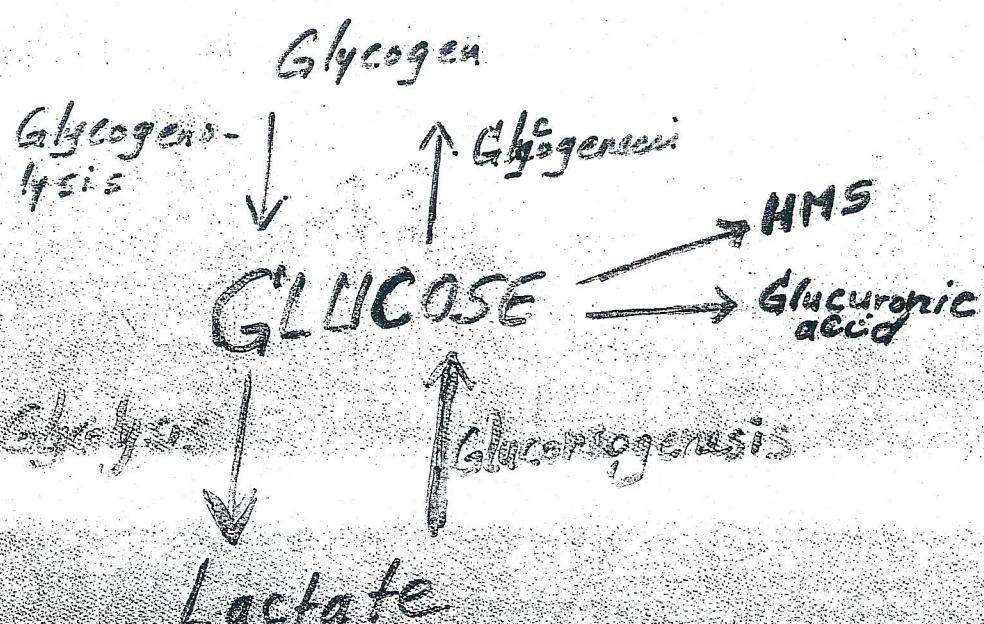


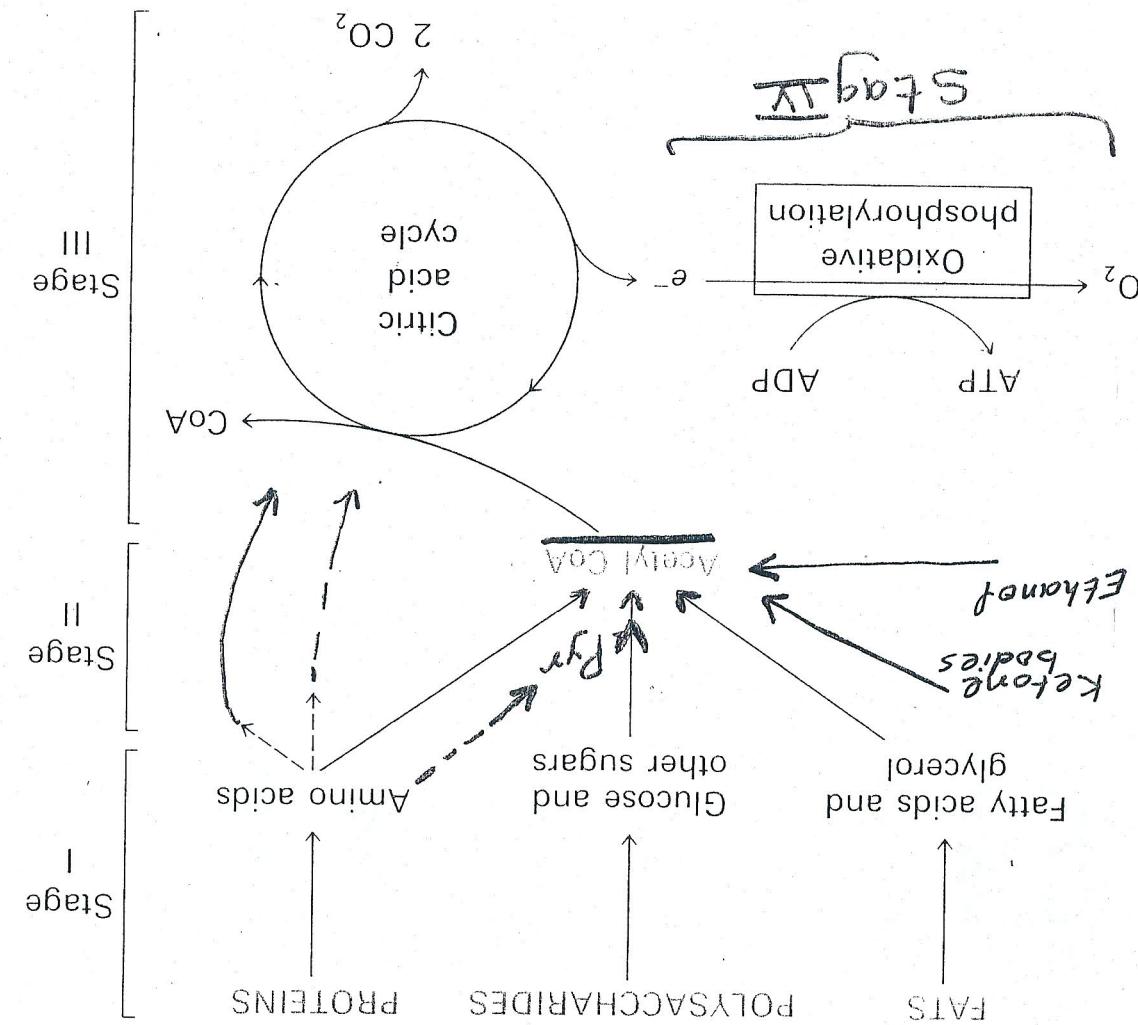
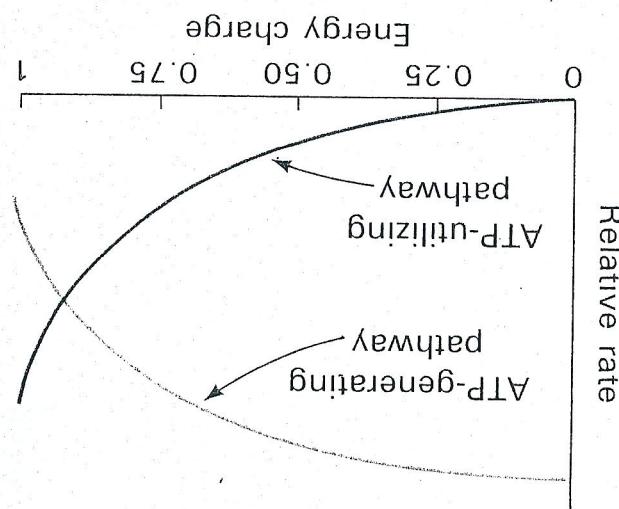
- OBJECTIVE :-

- Utilization of Glu \rightarrow Energy
- Non-Carbohydrate \rightarrow Glu
- Storage of Glu \rightarrow Glycogen
- Release of Glu from Glycogen
- HMS \rightarrow NAD PH \rightarrow Glu
- Glucuronic acid \rightarrow Degradation
- Interconversion of Sugar

- Over-all Picture :-



(1)



Origin of the Acetyl Group

Dietary Carbohydrates :-

→ 40 - 50% of Caloric intake

60% of Carbohydrate → STARCH

Sucrose, small amount of
Fru., Glu — fruit, honey, veg.

Lactose (animal)

No sp. sugar required

Glu ← → 11 other Sugars

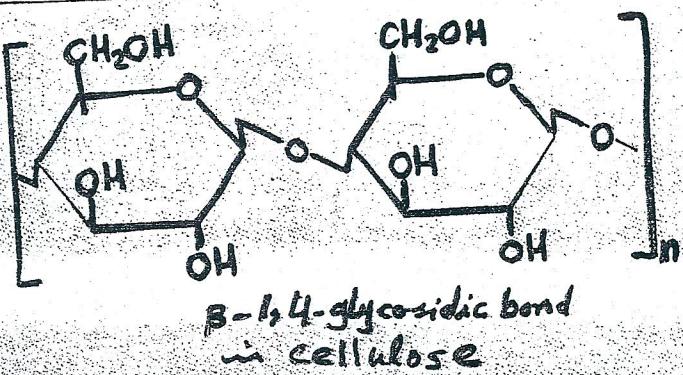
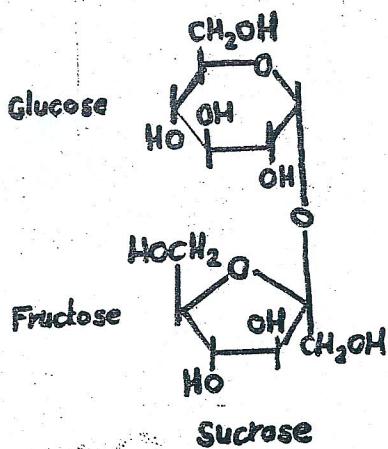
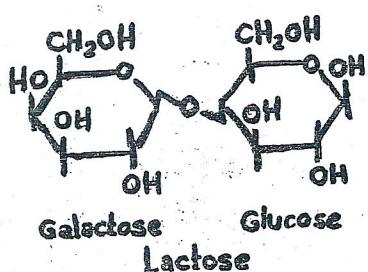
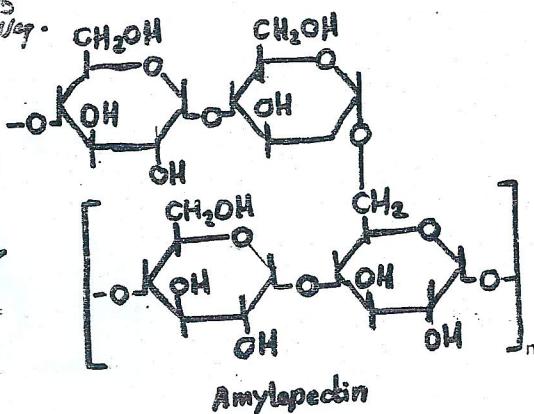
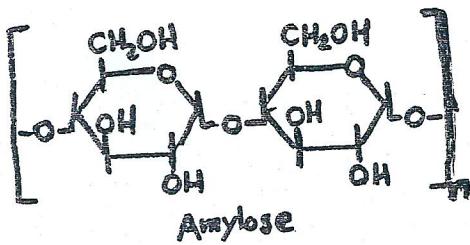
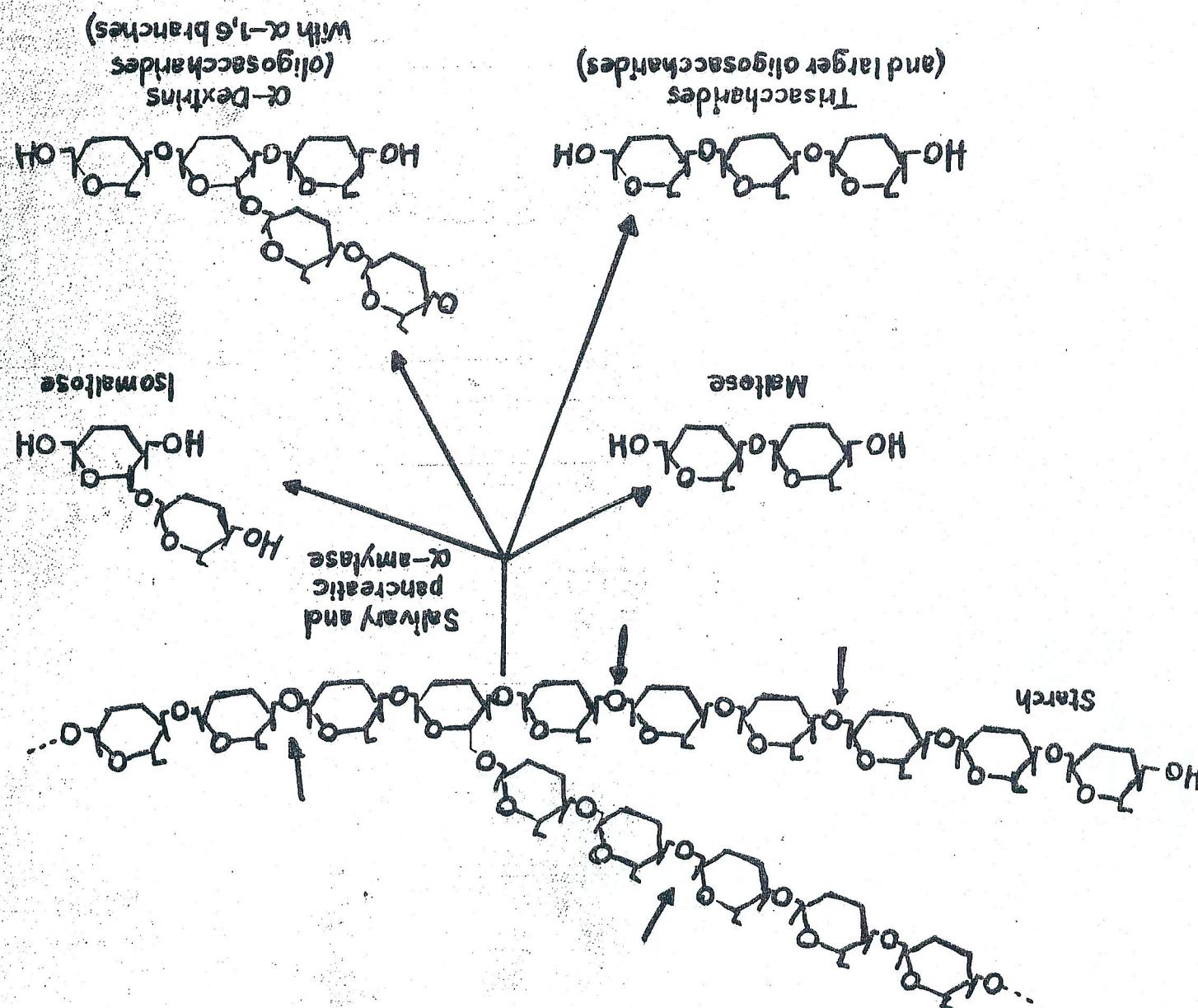


Fig. 25.12. Action of salivary and pancreatic α -amylase, on STARCH



Sucrase-Isomaltase Complex

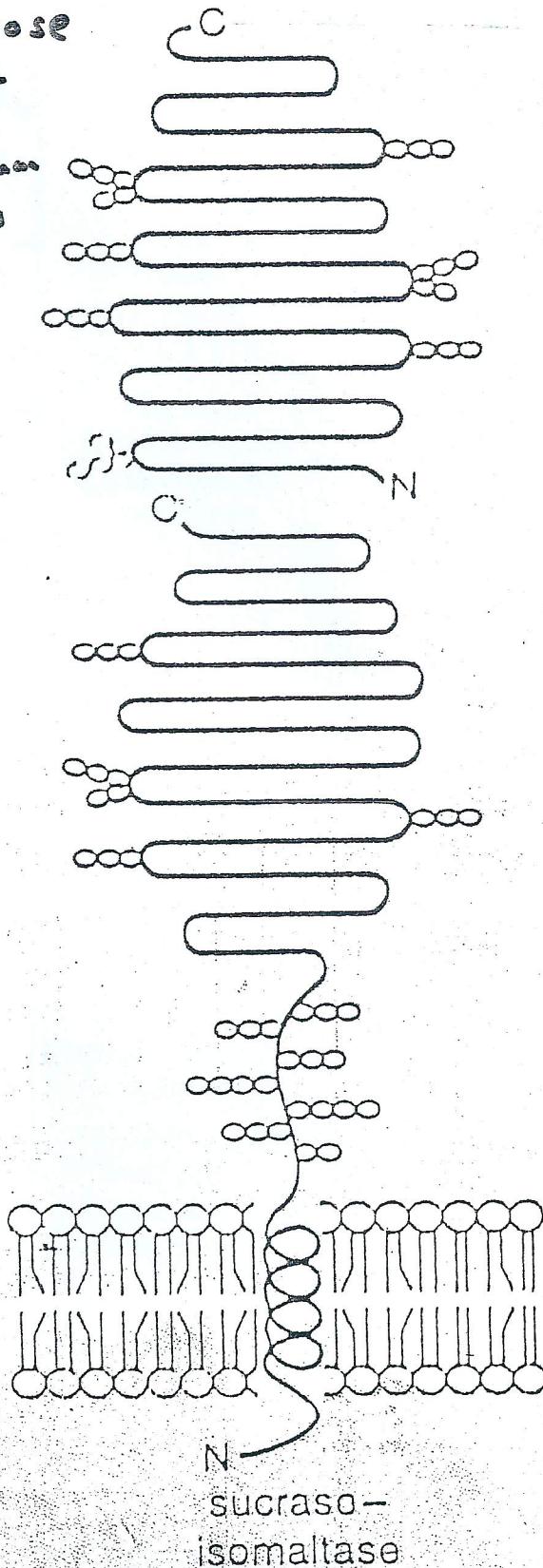
9

specificity:-

Maltose, Sucrose
and Iso-maltose

location:-

rich in jejunum
and lower bowel



sucrase (only sucrase activity)
+ high maltose and
maltotriose activity

they account for more
than 80% of maltase activity

isomaltase (performs most of
hydrolysis)
+ high maltose and
maltotriose activity

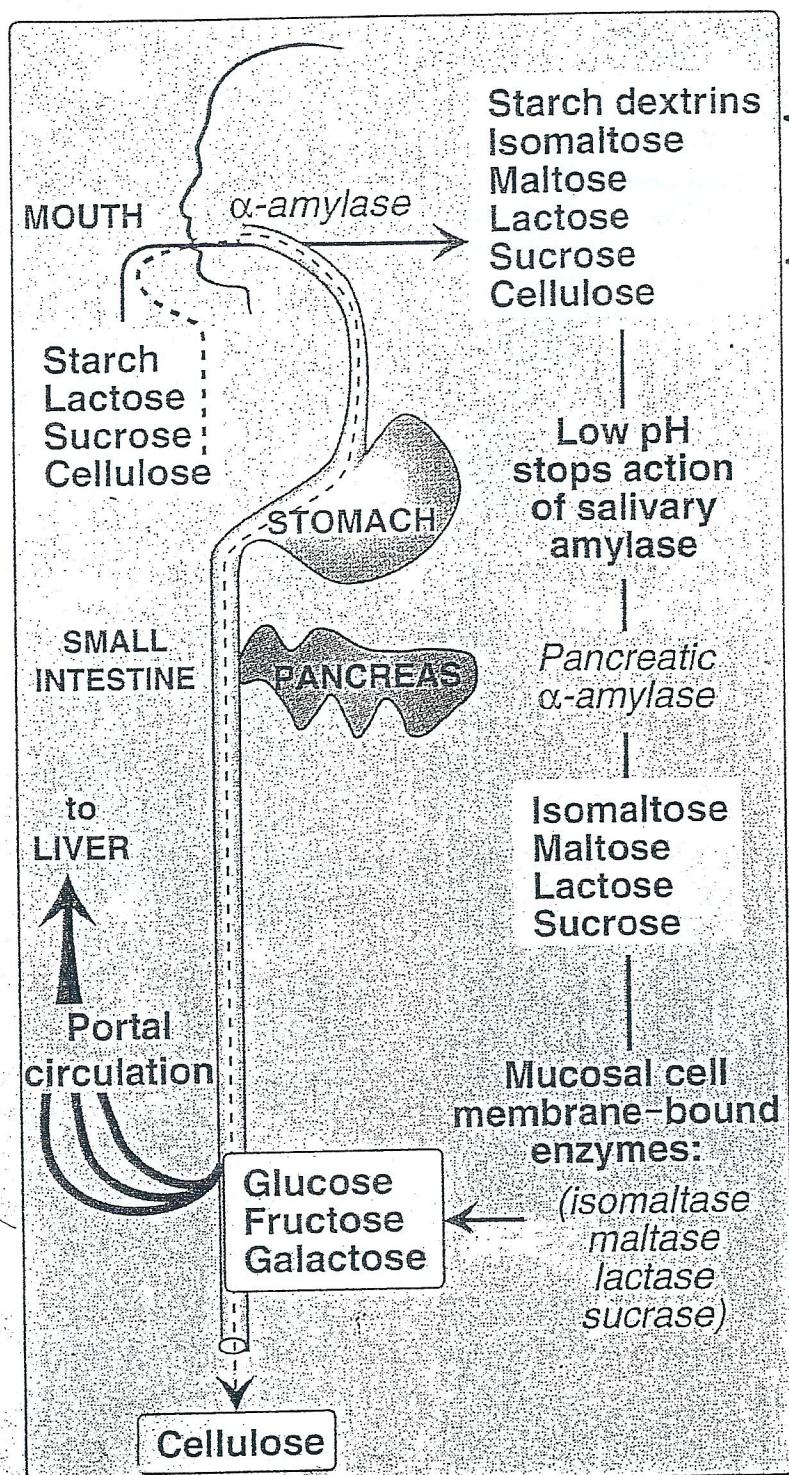
Connecting segment (stalk)

Transmembrane segment of absorptive cell

Cytoplasmic domain

Transmembrane domain

Digestion of Carbohydrate



- **Isomaltase:-**
 $\alpha\text{-}1\rightarrow6$ in Isomaltose

- **Maltase**
 $\alpha\text{-}1\rightarrow4$ in maltose and maltotriose

- **Sucrase**

$\alpha\text{-}1\rightarrow2$ in Sucrose

- **Lactase**
 $\beta\text{-}1\rightarrow4$ in Lactose

- **Trehalase**
 $\alpha\text{-}1\rightarrow1$ in trehalose in mushrooms and other fungi

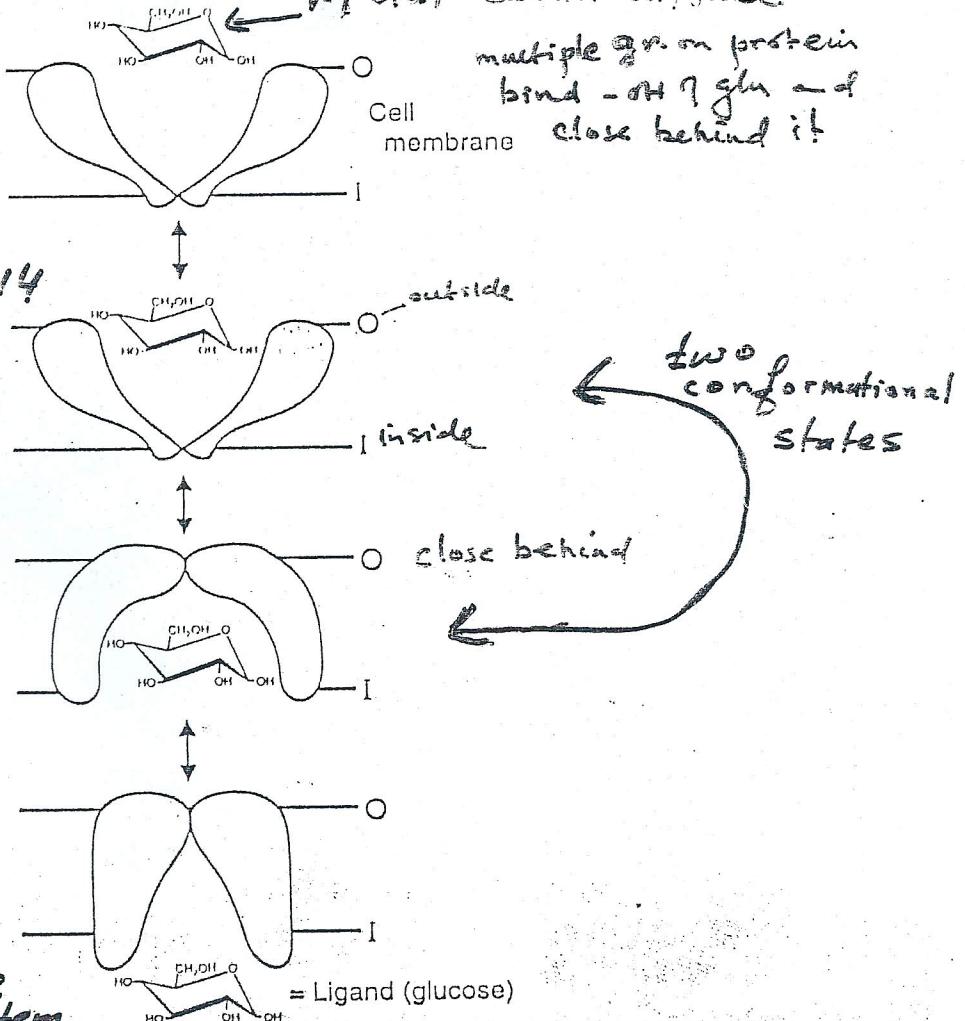
- Sucrase + Isomaltase
 $\underbrace{\text{single protein}}_{\text{split}} \xrightarrow{\text{split}} \text{two associated subunits}$
 $\xrightarrow{\text{complexed}}$
- Maltase + exoglucosidase (glucoamylase) $\xrightarrow{\text{no split}}$
 $\underbrace{\text{similar complex}}_{\text{---}} \xrightarrow{\alpha\text{-}1\rightarrow4 \text{ in limit dextrins}}$

6.

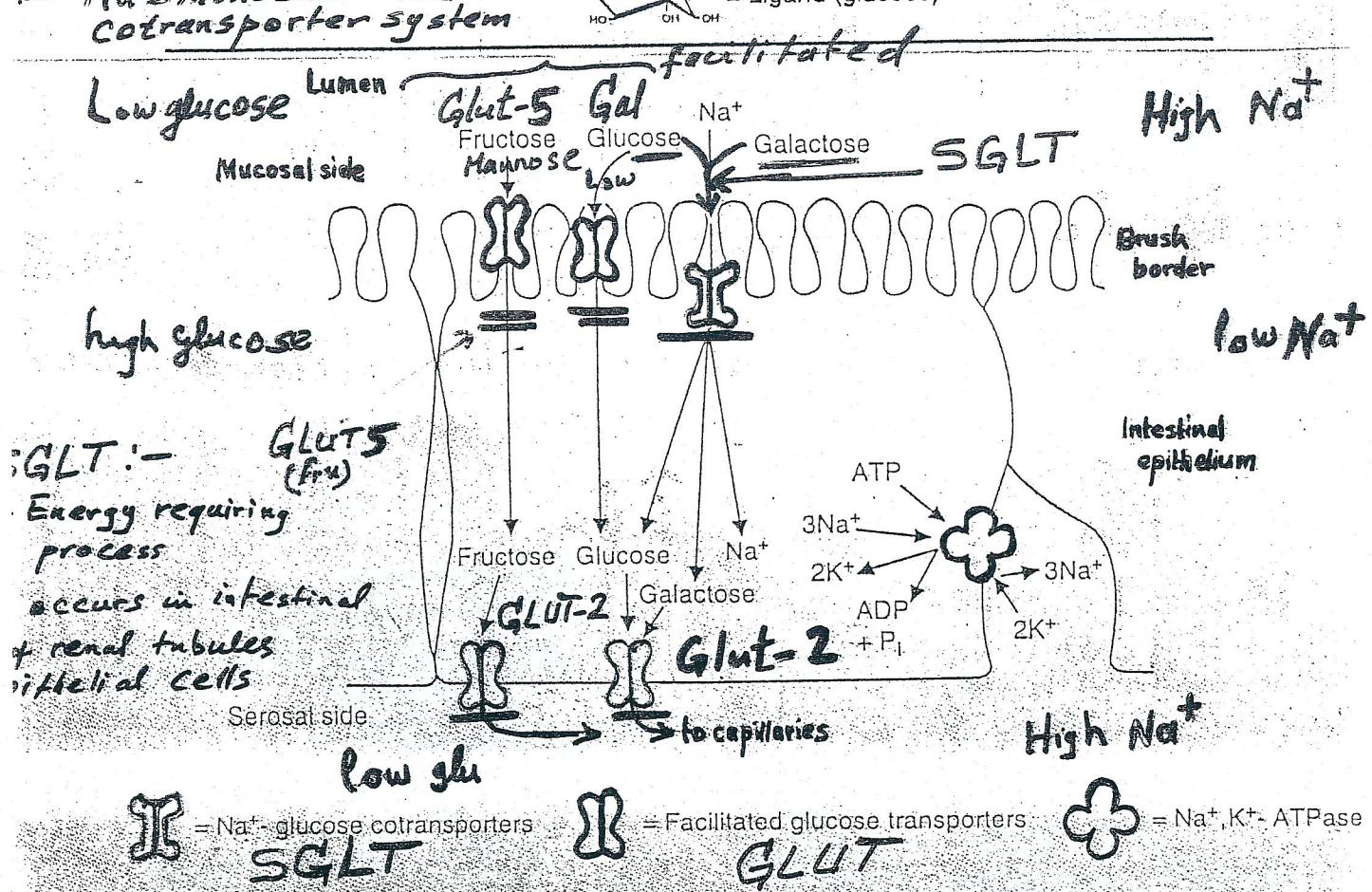
Absorption of sugars

K⁺-Polar can't diffuse

A. Na⁺-independent facilitated diffusion transport



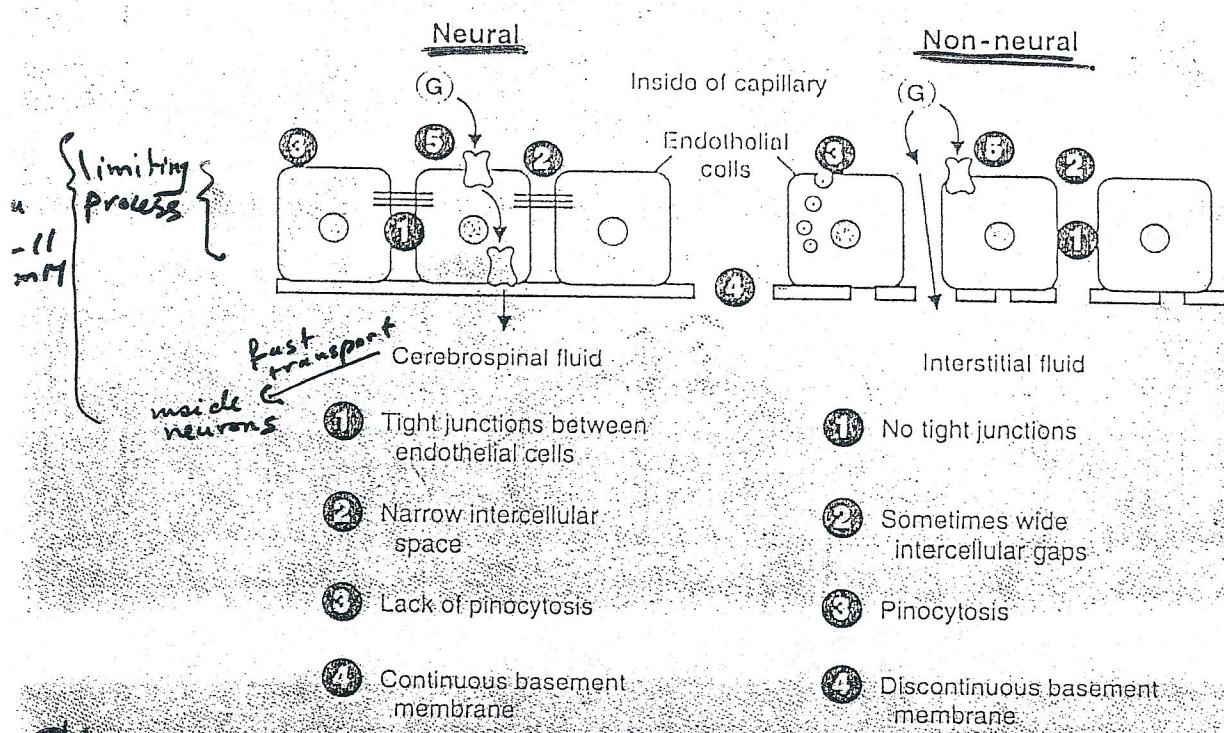
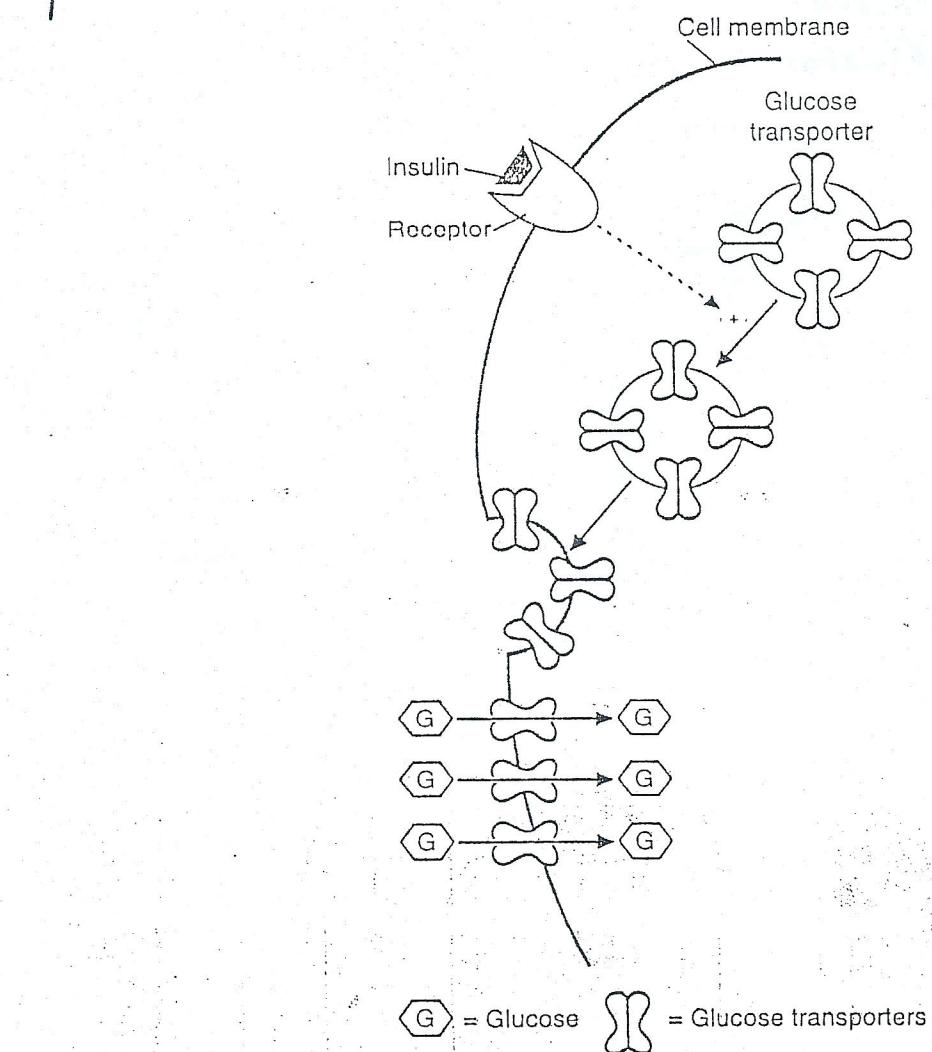
B. Na⁺ (SGLT)
Na⁺-monosaccharide cotransporter system



7

Stimulation by Insulin of Glucose Transport into muscle and adipose Tissues

7d



Glucose transport through the Capillary Endothelium

Transpiration
way
Ce₆ nerve
Function
I Sodium dependent-Transporter:- 5GLT
(7)

Small intestine
and kidney

Active uptake from lumen of intestine, reabsorption of glu in proximal tubule of kidney against conc. gradient

II Facilitative Bidirection Transporters

GLUT-1 Erythrocyte +
Blood-brain barrier, also
retinal, placental, testis -
barriers

uptake of Glu
 $K_m = 1 \text{ mM}$

GLUT-2 Liver, Pancreatic β -cell
small intestine, kidney
(Serosal surface)

Rapid uptake and
release of Glu
 $K_m = \approx 15 \text{ mM}$
High V_{max}
Glucose sensor

GLUT-3 brain, kidney, placenta
(Major transporter in CNS) uptake of Glu
 $K_m = \approx 1 \text{ mM}$
(High affinity)

GLUT-4 Heart and skeletal muscle, Insulin stimulated
adipose tissue uptake of Glu
 $K_m = \approx 5 \text{ mM}$

GLUT-5 Small intestine absorption of free
& spermatozoa

at endoplasmic reticulum
membrane of glucogenic tissue
(liver and kidney)

GLUT-7

Abnormal Degradation of Disaccharides

Lactase deficiency

$\frac{1}{2}$ World's population
90% African & Asian adults

isomaltase

Sucrase deficiency

10% Ashkenazi

2% North European
are heterozygotes

Causes:-

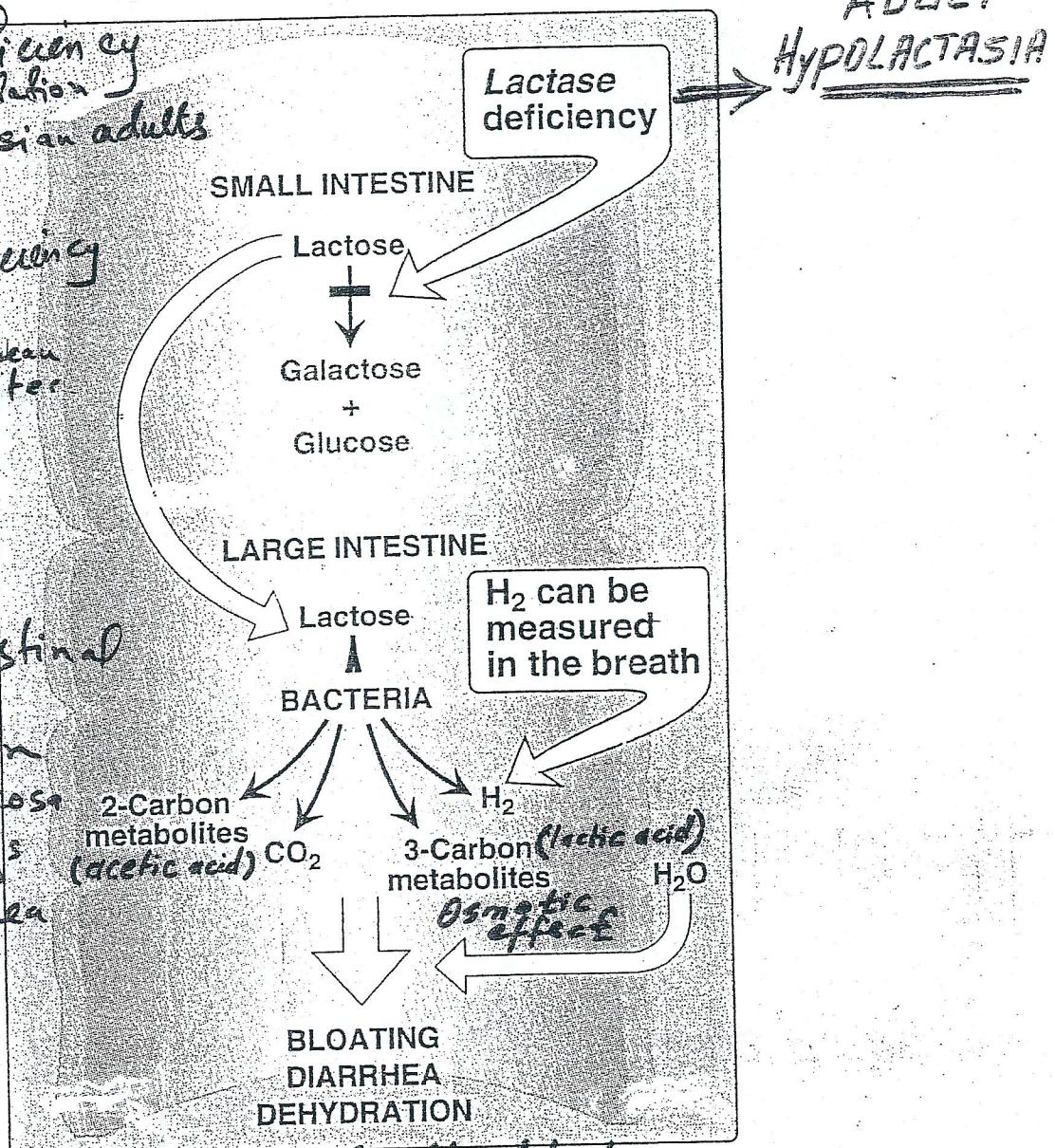
Genetics

Variety of Intestinal diseases

Malnutrition

Injury of mucosa
e.g. by drugs

Severe diarrhea



12 L extra cellular fluid lost per
9 gr glucose in 1 glass of milk.

Maximal activity → 1 month of age
declines → adult level at 5 to 7 yr. age
(10% of infant level)