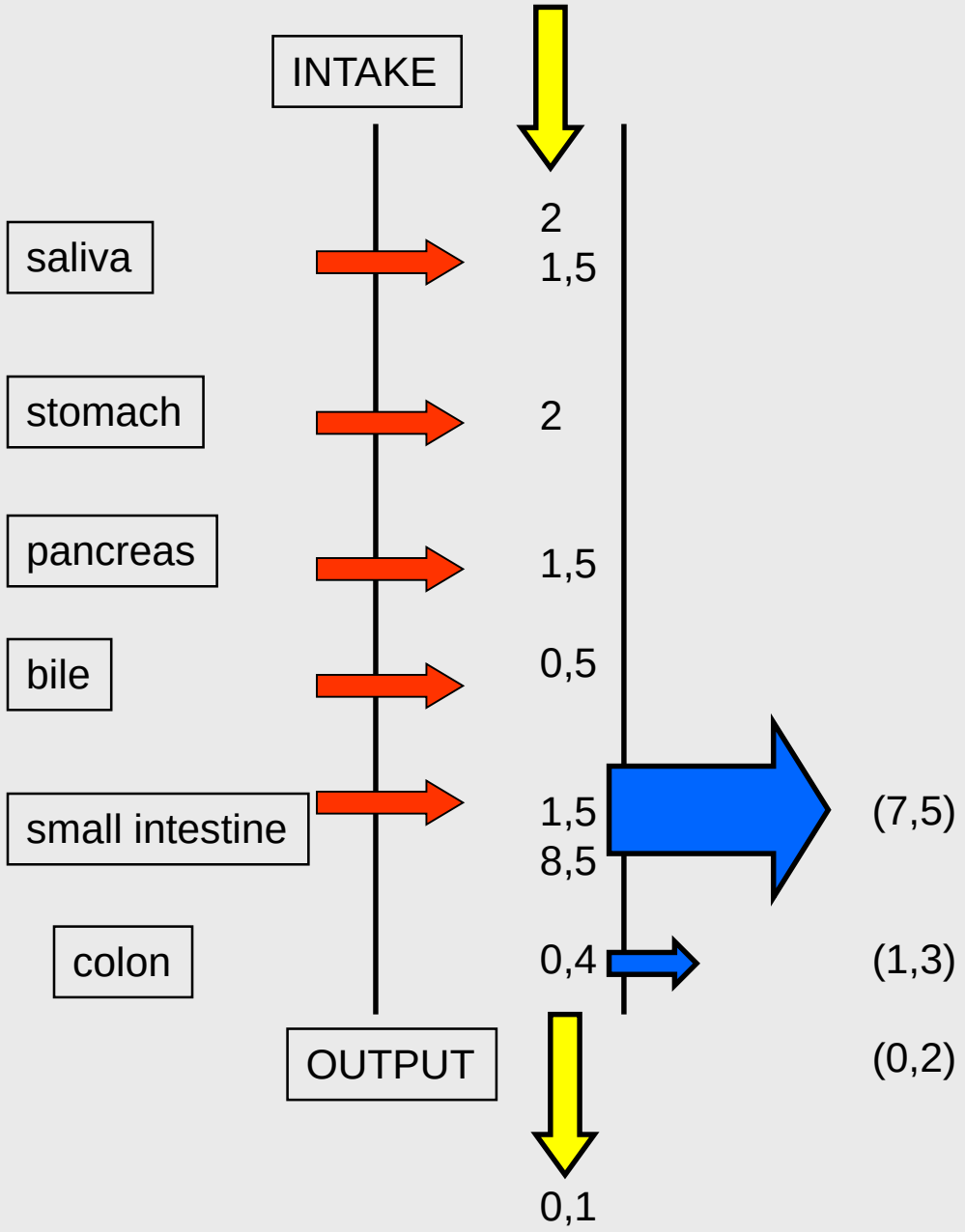
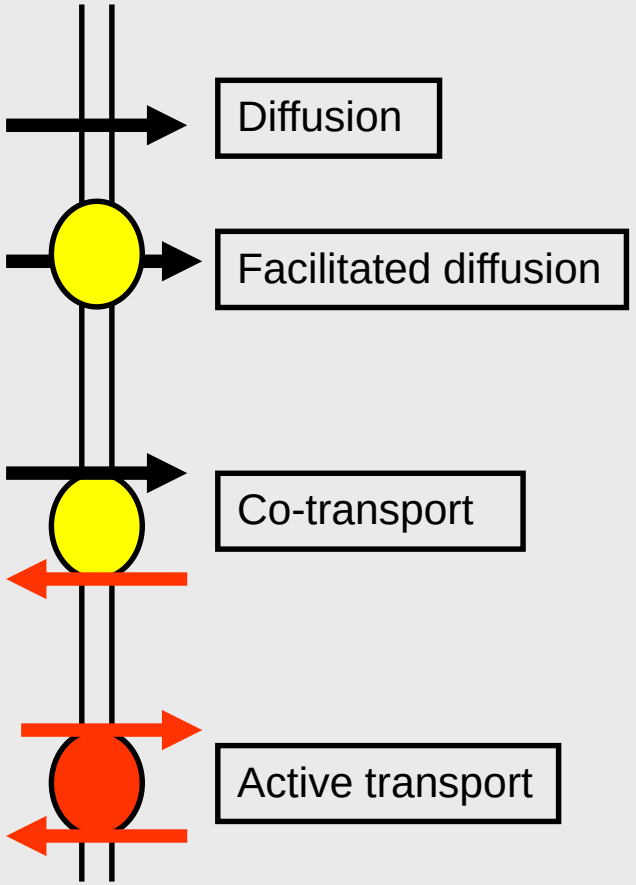
WATER BALANCE (l / DAY)

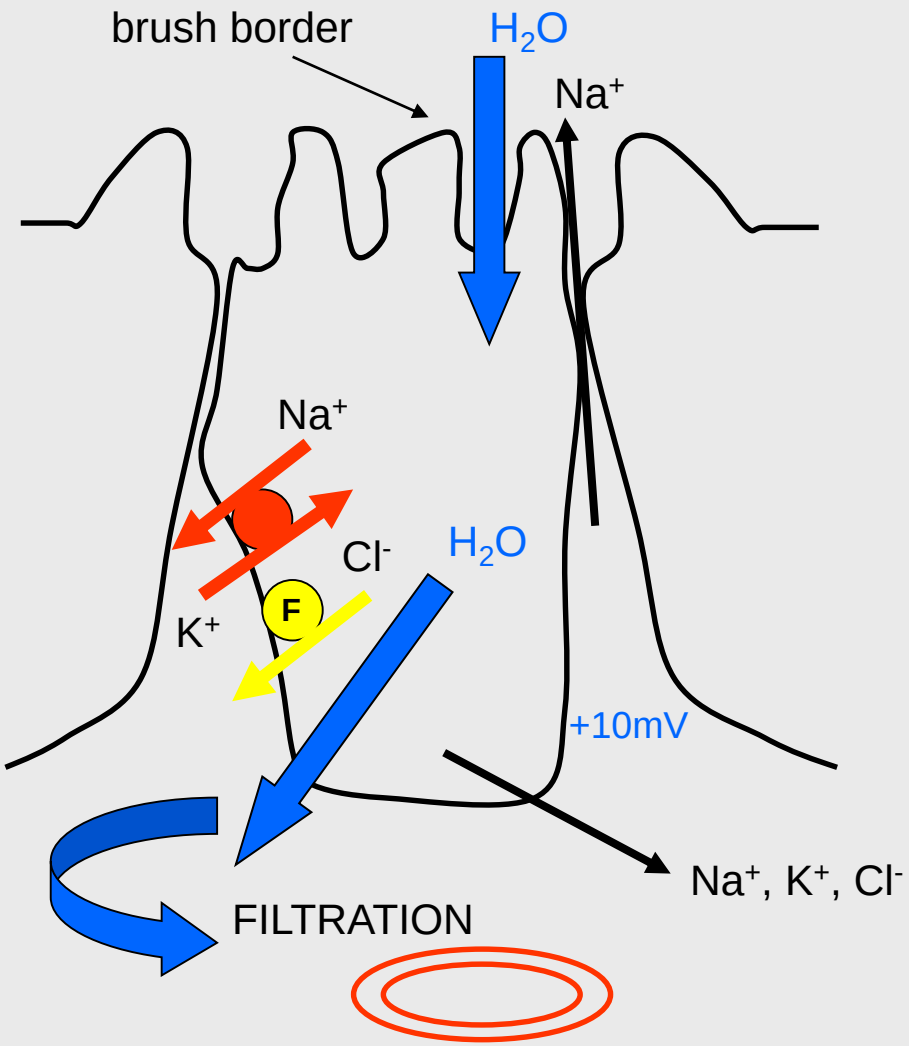




WATER ABSORPTION (isoosmotic)

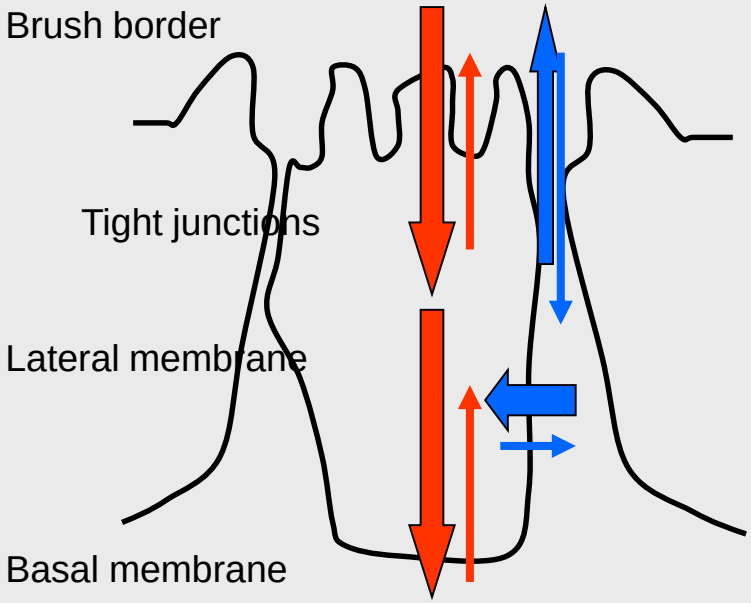
(small intestine, gallbladder, stomach, colon)

(duodenum-osmot.draft of H_2O)



Continuous osmotic gradient

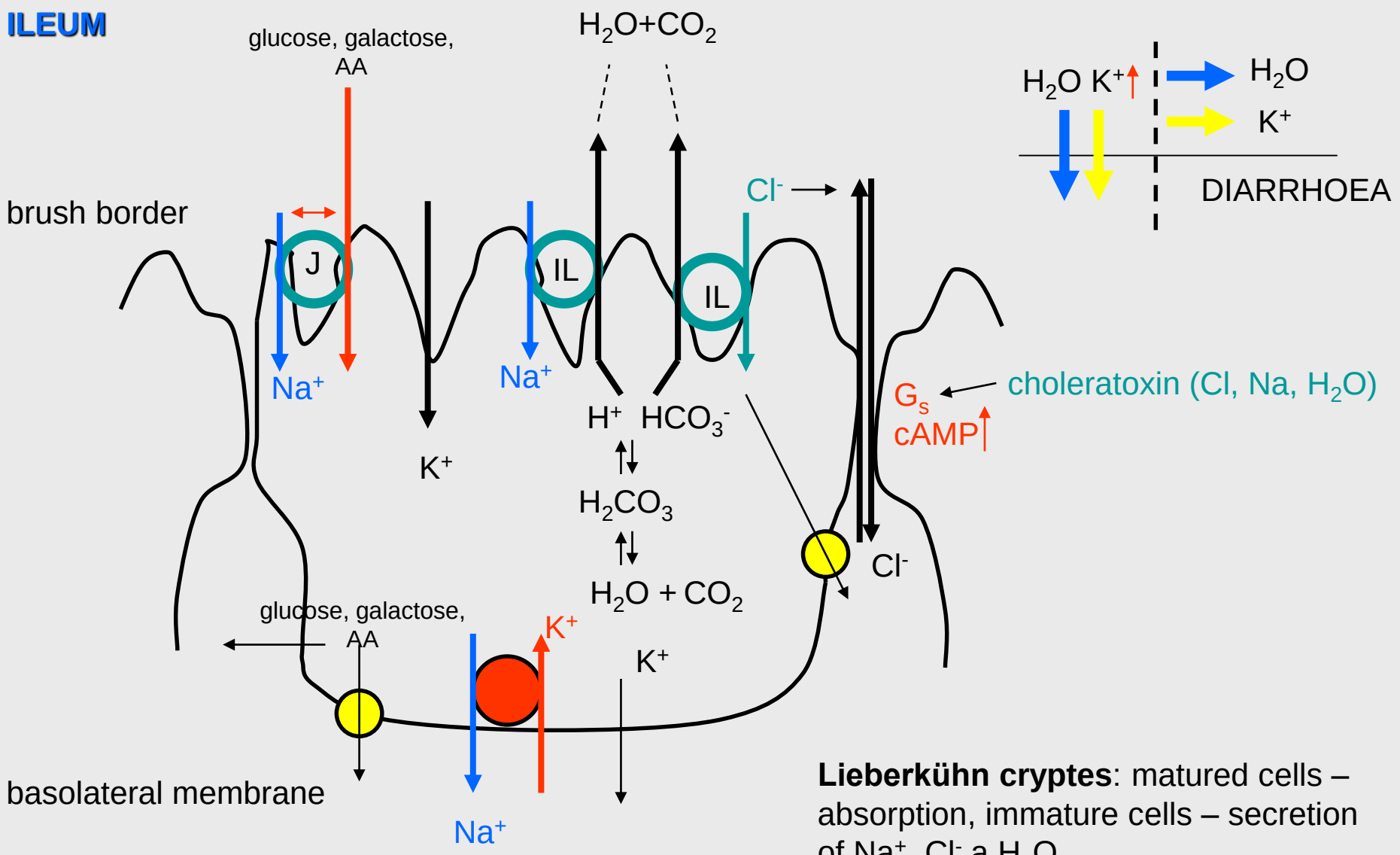
TRANSPORT
- Transcellular
- Paracellular



STIMULATION: digestion products

TRANSPORT OF ELECTROLYTES

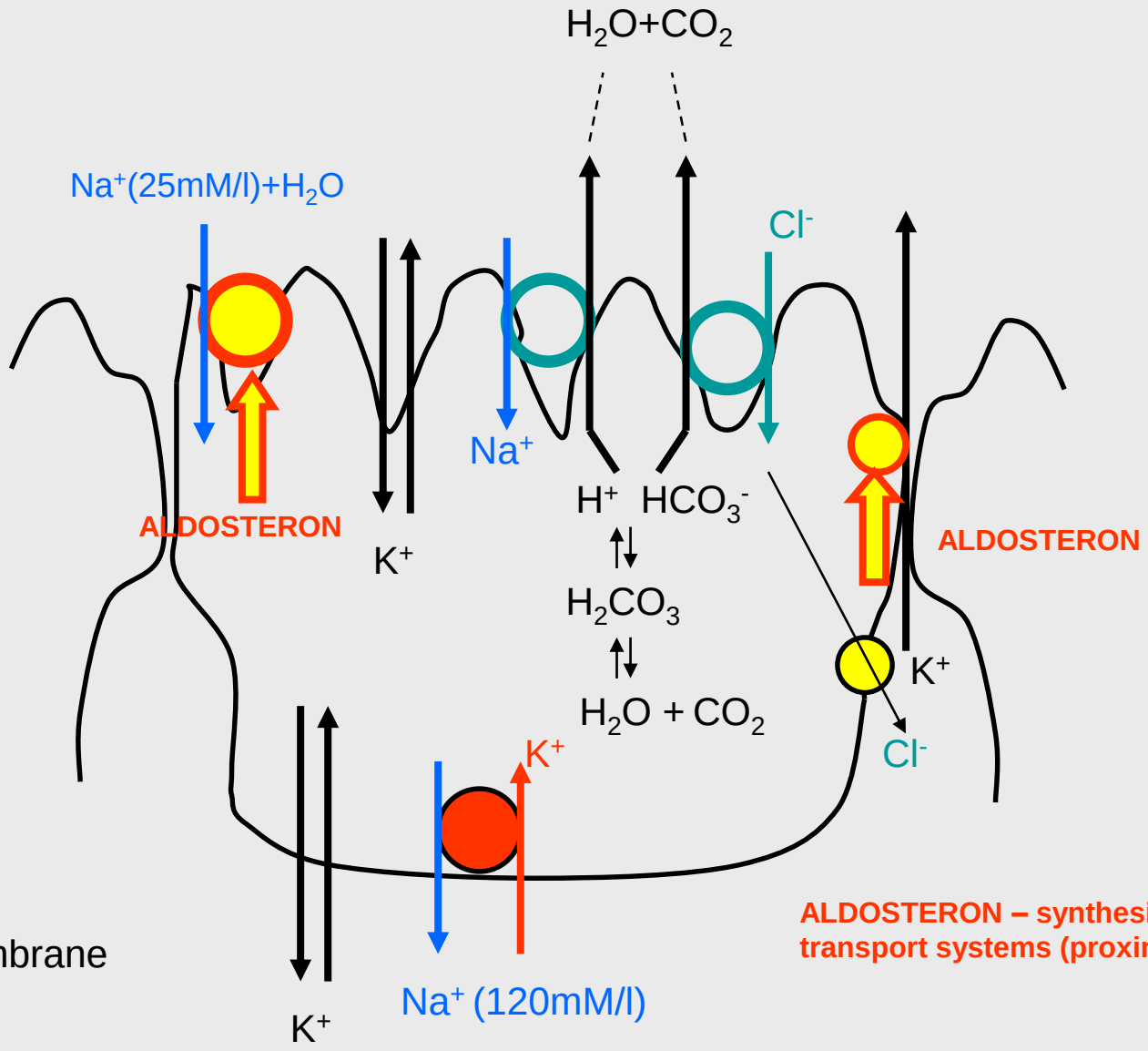
JEJUNUM
ILEUM



Lieberkühn cryptes: matured cells – absorption, immature cells – secretion of Na^+, Cl^- a H_2O

TRANSPORT OF ELECTROLYTES

COLON



ALDOSTERON – synthesis of transport systems (proximal tubule)

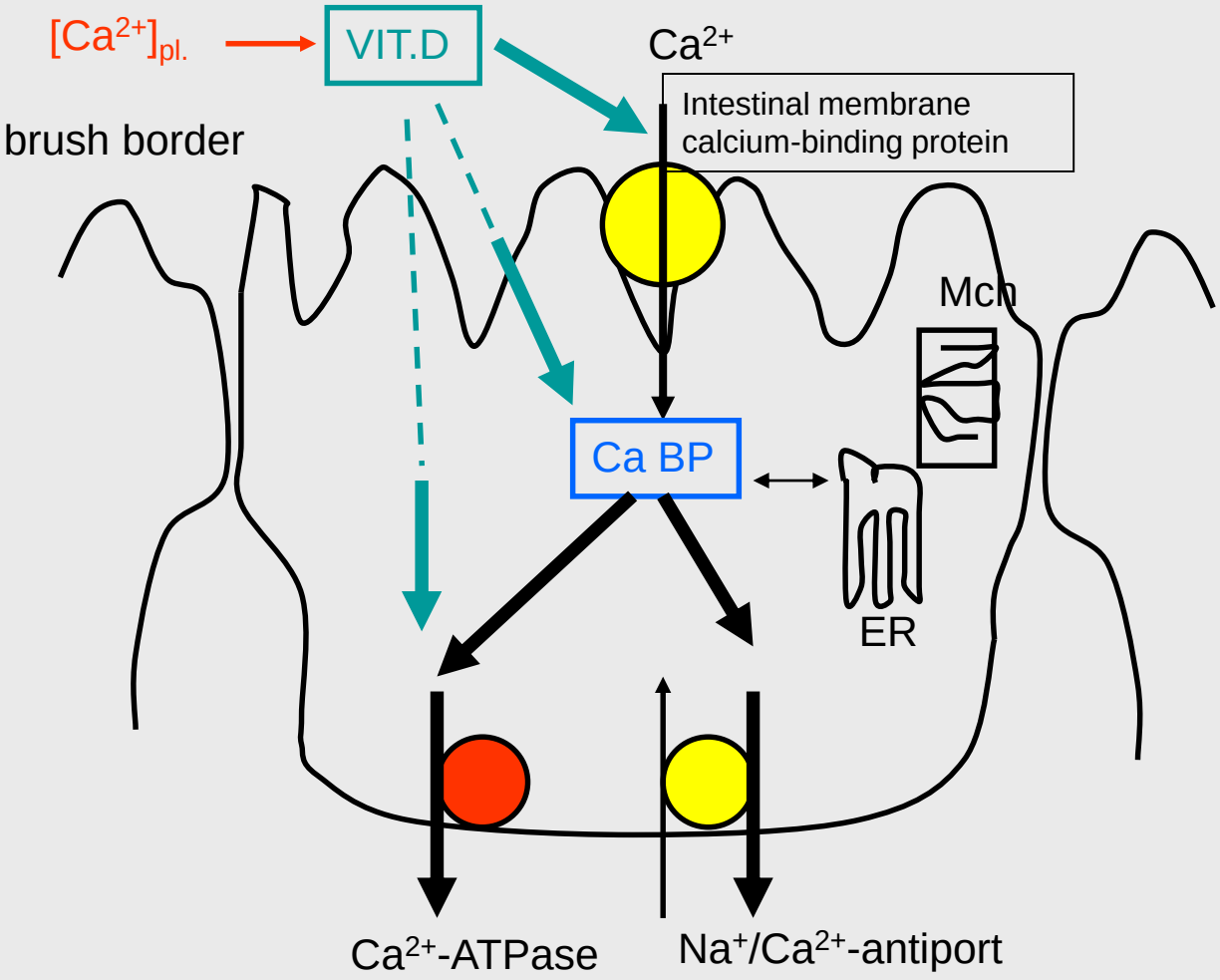
REGULATION OF TRANSPORT OF WATER AND ELECTROLYTES

1. **Autonomous nervous system**: **SYMP** – increase of absorption of water, sodium and chlorine

2. **Aldosteron:** colon – stimulation of secretion of potassium and absorption of sodium and water (up-regulation of Na/K-ATPase, Na-channel)

3. **Glucocorticoids:** colon - stimulation of secretion of potassium and absorption of sodium and water (up-regulation of Na/K-ATPase)

ABSORPTION OF Ca^{2+}



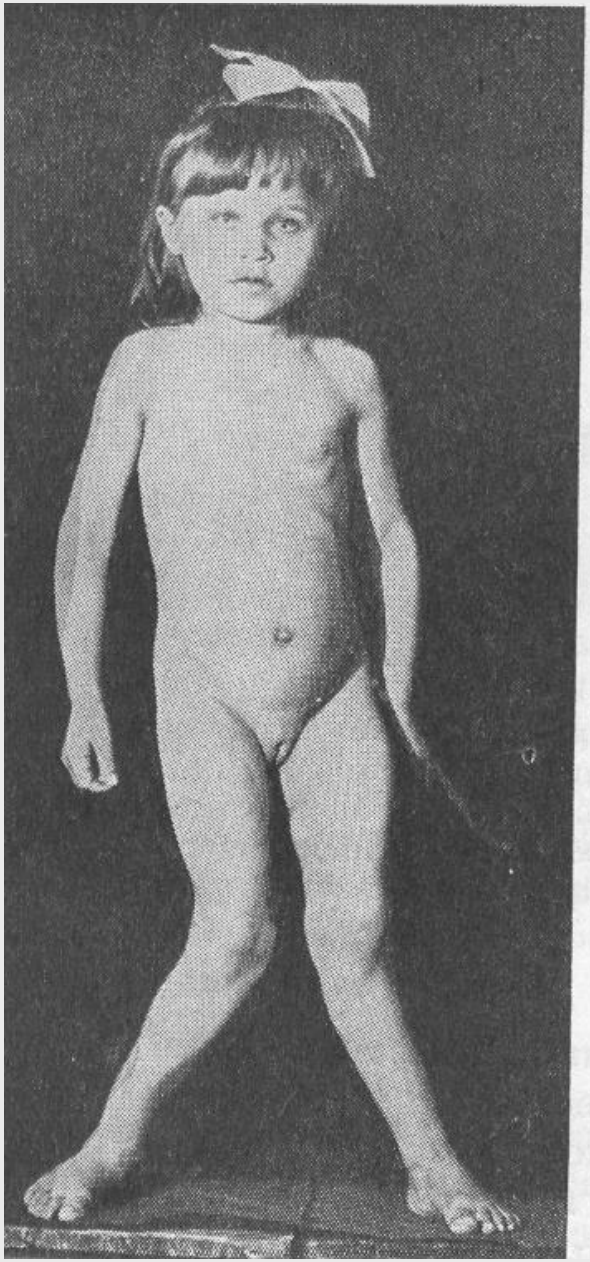
INTAKE: 1000mg/day
ABSORPTION: 350mg/day

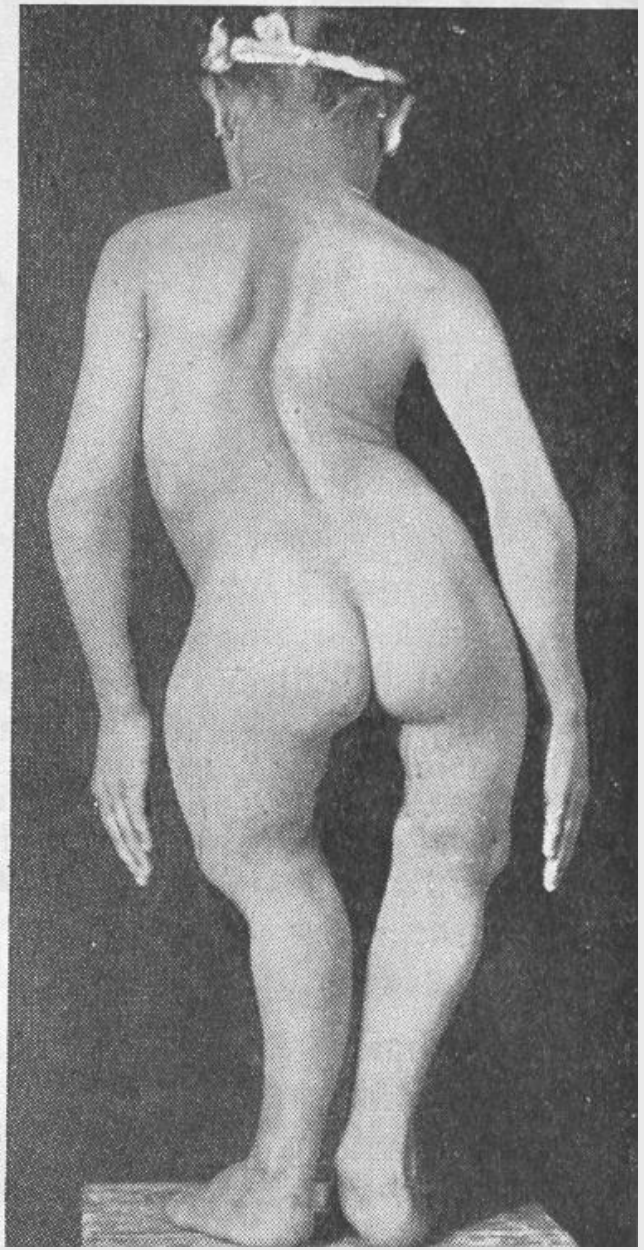
Absorption against concentration gradient (1:10) in all GIT (D, J), 50x slower than absorption of Na^+

1,25-dihydrocholecalciferol

Calbindin – prevention of formation of insoluble salts (phosphates, oxalates)

RACHITIS





ABSORPTION OF Fe^{2+}

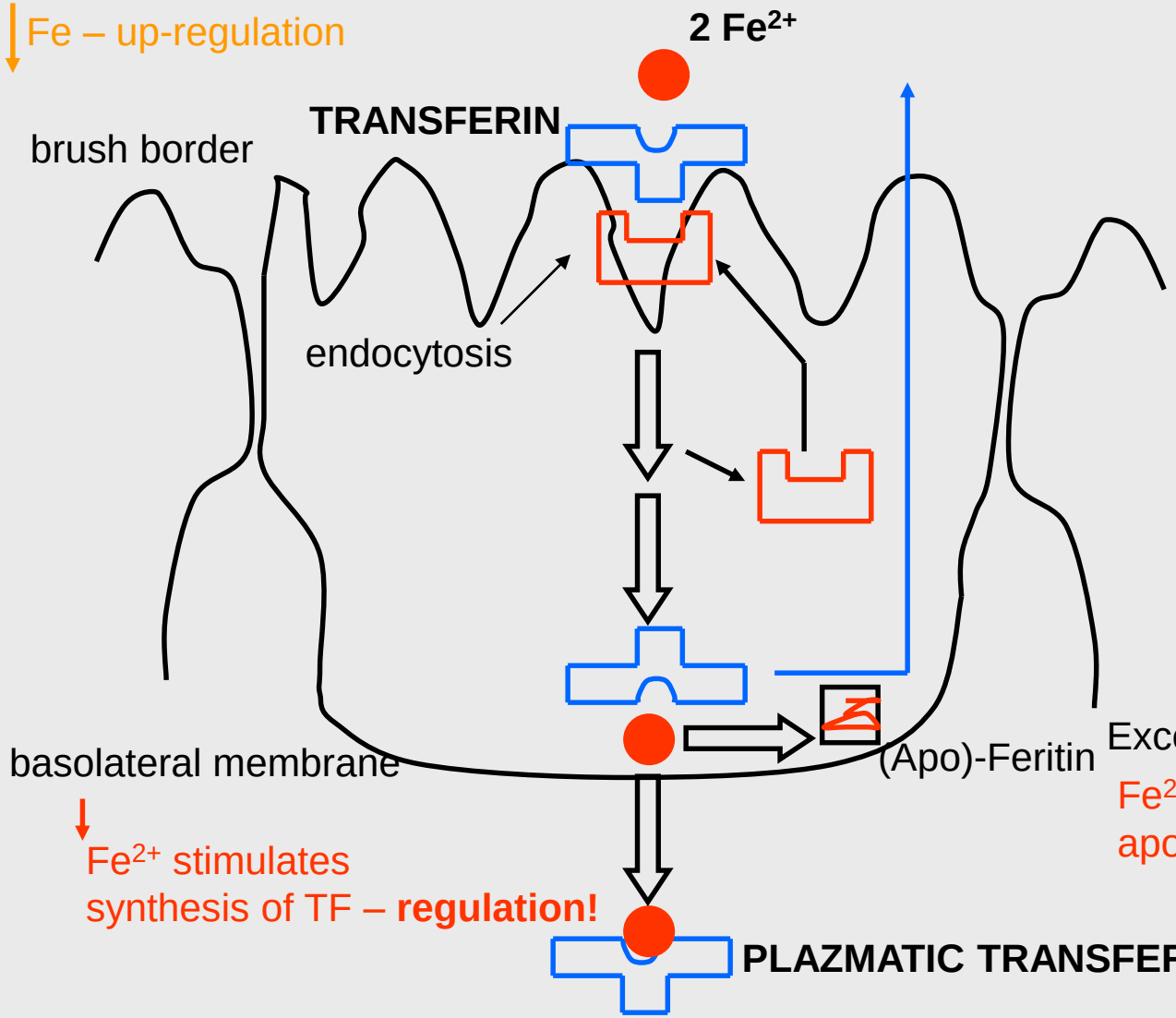
INTAKE: 15-20mg/day
ABSORPTION:
Men: 0,5 - 1mg/day
Women: 1 – 1,5mg/day
D, J

Insoluble salts and complexes (20:1) – limitation of absorption
Decrease of pH

↓ pH: Fe^{3+} → Fe^{2+}

Fe – up-regulation

70% - Hb
25% - F



Excess of Fe^{2+} – loss with epithelium

Fe^{2+} stimulates synthesis of apoferitin (translation) – **regulation!**

Fe^{2+} stimulates synthesis of TF – **regulation!**

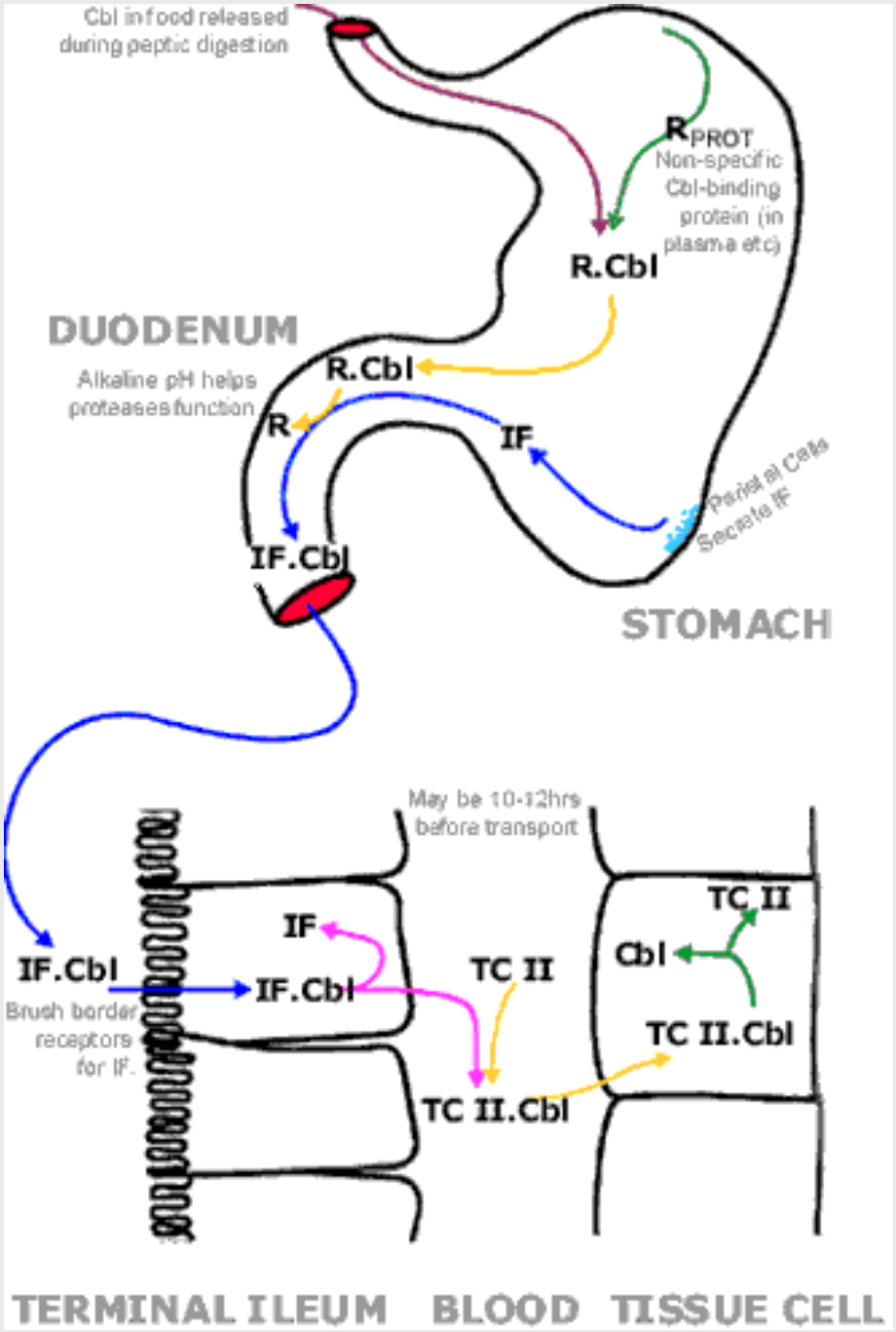
Hemosiderin – deposits of Fe in desmosomes

VITAMIN B_{12}

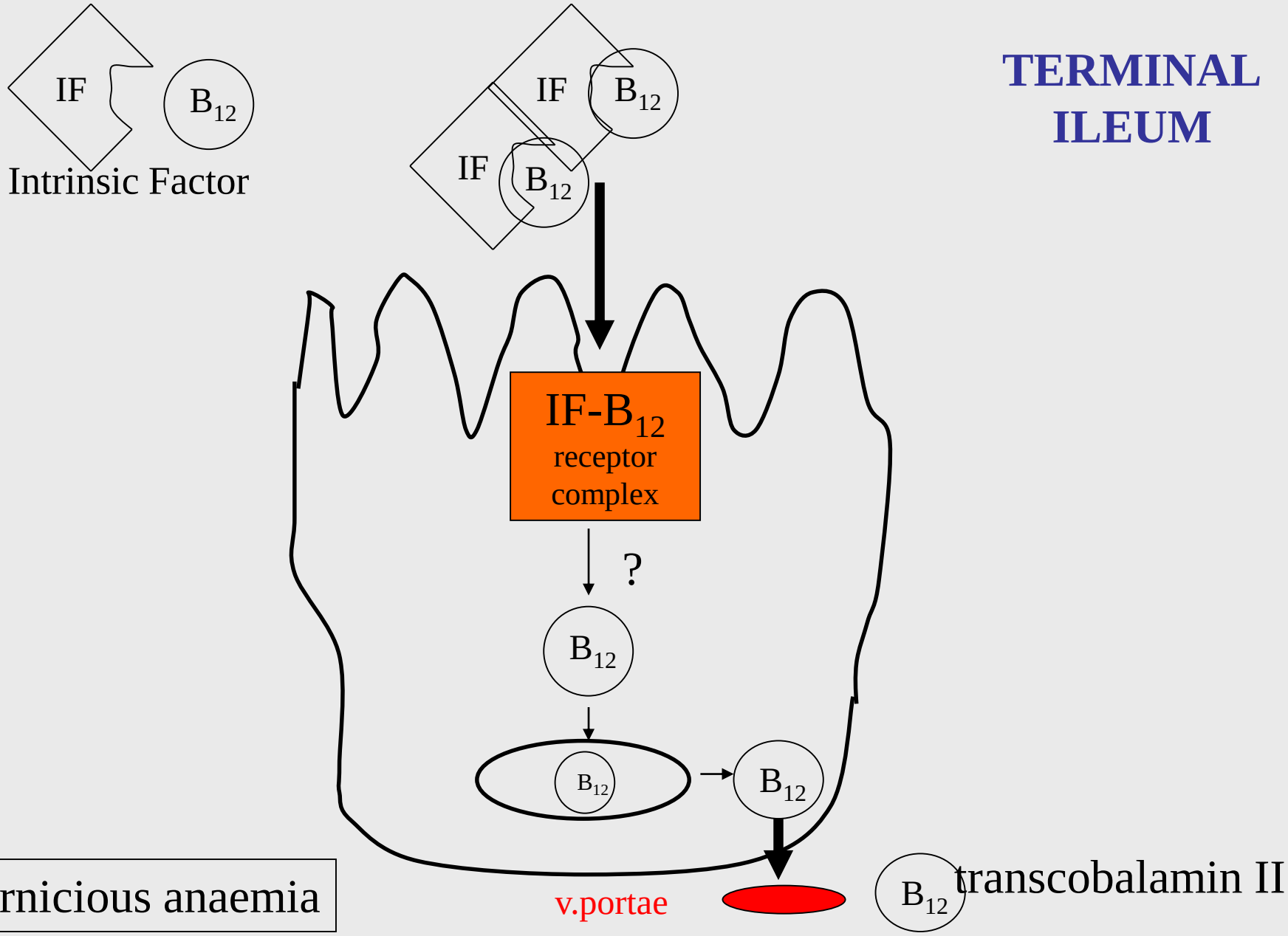
- Daily dose is close to absorption capacity
- Synthesised by bacteria in colon – BUT there is not absorption mechanism
- Store in liver (2-5mg)
- In bile 0,5-5μg / day, reabsorbed
- Daily loss – 0,1% of stores → stores will last for 3-6 years

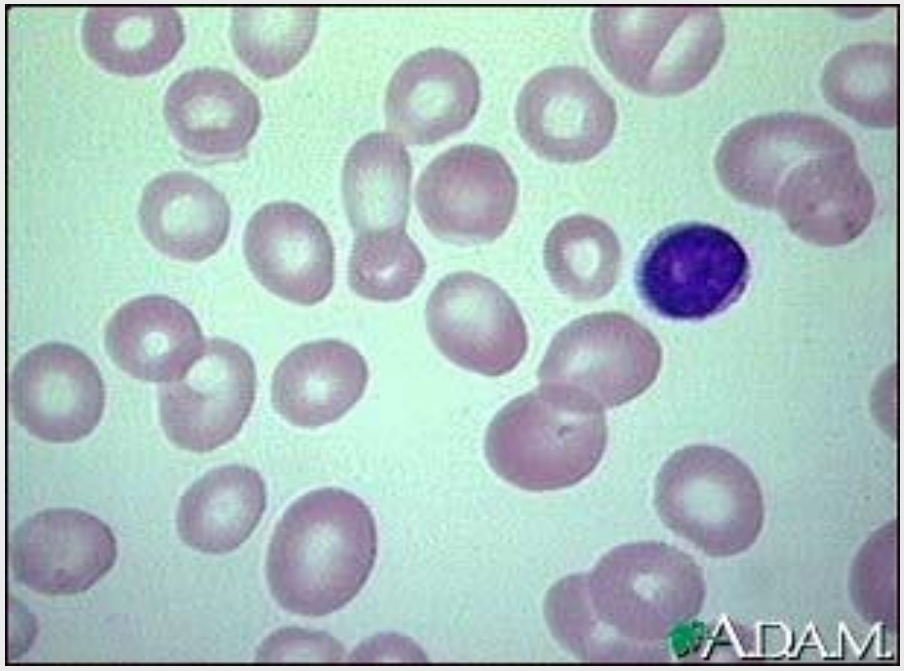
ABSORPTION

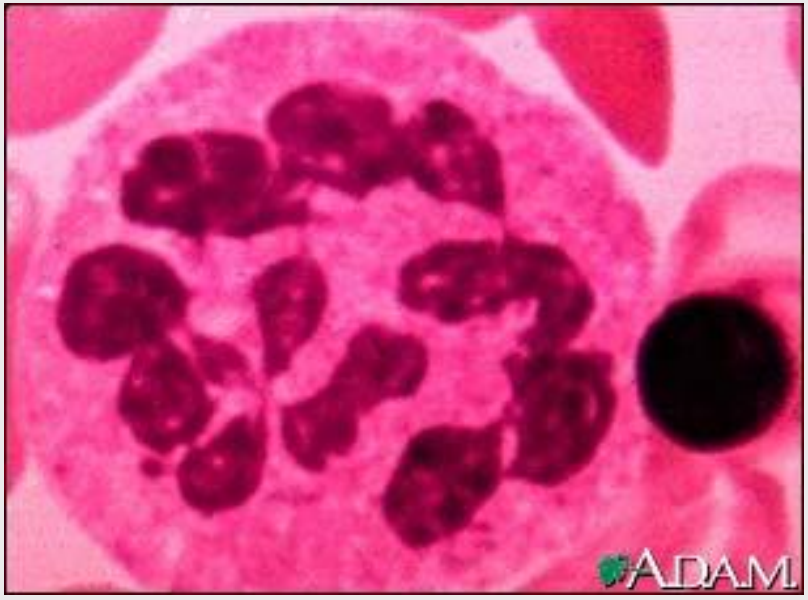
1. **Gastric phase**: B_{12} is bound to proteins, low pH and pepsin release it; bound to glycoproteins – **R-proteins** (saliva, gastric juice), almost pH-undependable; intrinsic factor (**IF**) – parietal cells of gastric mucosa; most of vitamin bound to R-proteins
2. **Intestinal phase:** pancreatic proteases, cleavage of R-B_{12}, bound to IF (resistant to pancreatic proteases)


Cbl in food released during peptic digestion
R PROT
Non-specific Cbl-binding protein (in plasma etc)
R.Cbl
DUODENUM
Alkaline pH helps proteases function
R.Cbl
R
IF
Parietal Cells Secrete IF
IF.Cbl
STOMACH
May be 10-12hrs before transport
IF
IF.Cbl
IF.Cbl
Brush border receptors for IF.
TC II
TC II.Cbl
TC II
Cbl
TC II.Cbl
TERMINAL ILEUM
BLOOD
TISSUE CELL

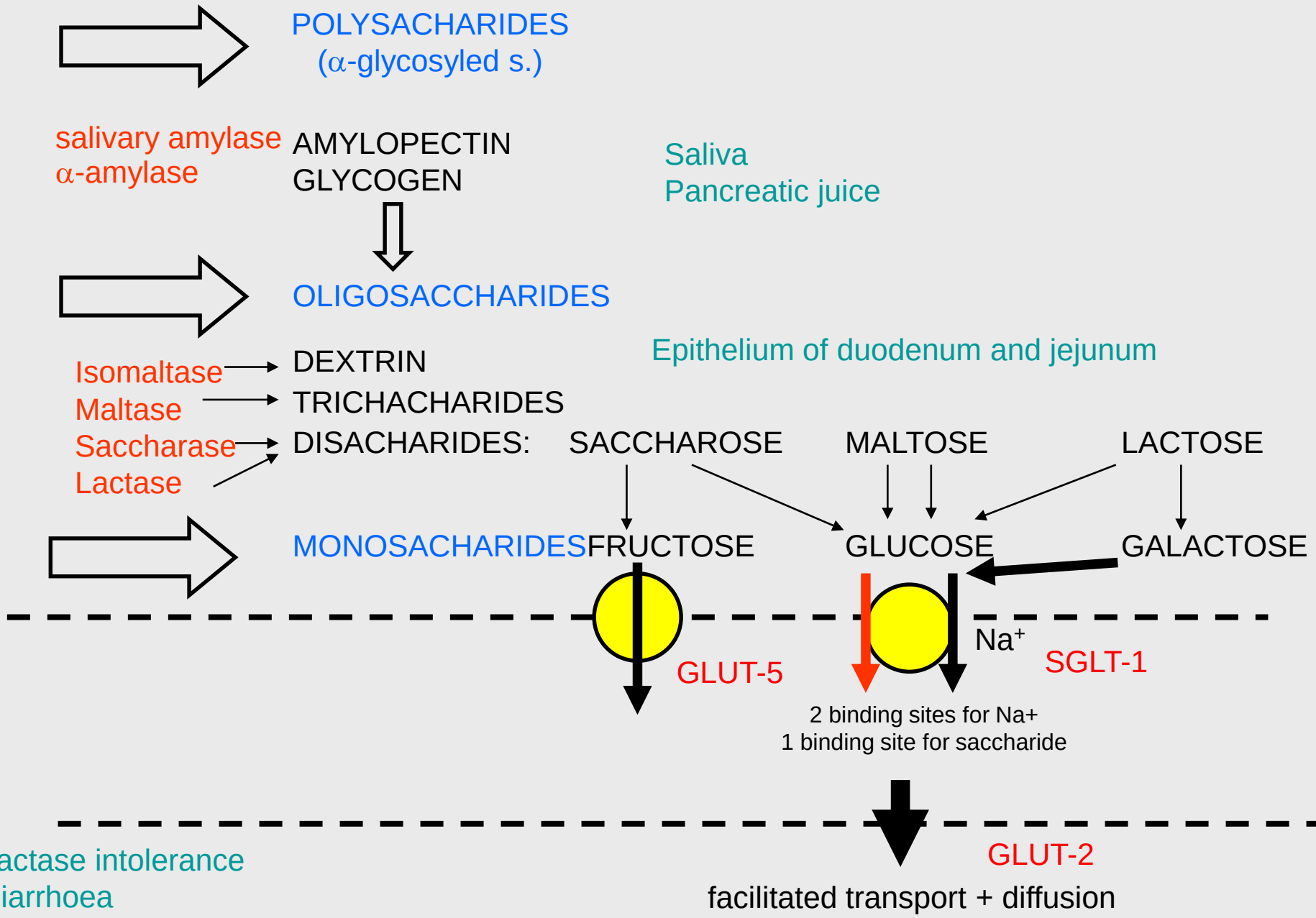
ABSORPTION OF B_{12} VITAMIN



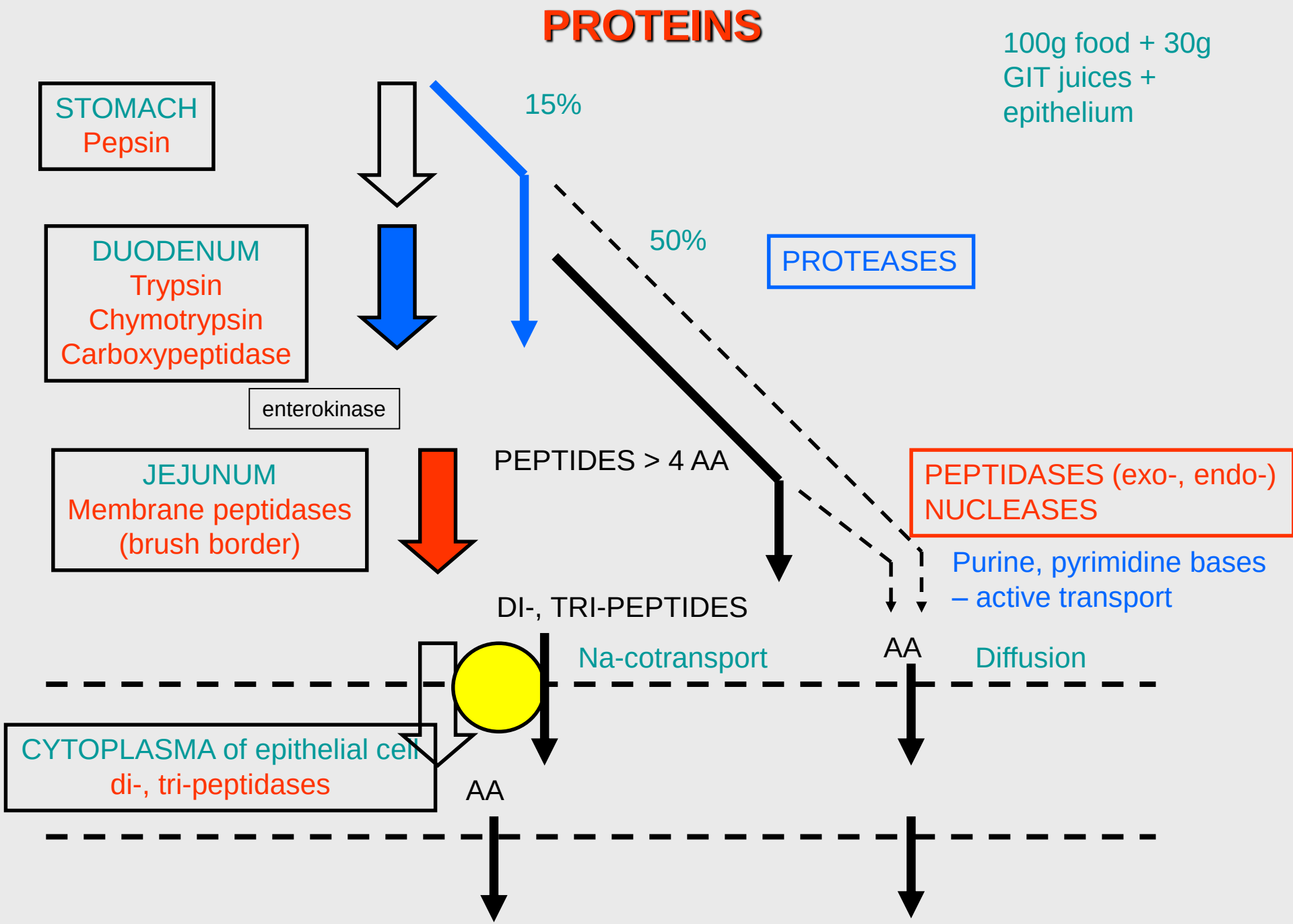

A.D.A.M.


A.D.A.M.

SACCHARIDES



- Lactase intolerance
- Diarrhoea


PROTEINS
100g food + 30g GIT juices + epithelium
STOMACH
Pepsin
15%
DUODENUM
Trypsin
Chymotrypsin
Carboxypeptidase
50%
PROTEASES
enterokinase
JEJUNUM
Membrane peptidases (brush border)
PEPTIDES > 4 AA
PEPTIDASES (exo-, endo-)
NUCLEASES
Purine, pyrimidine bases – active transport
DI-, TRI-PEPTIDES
Na-cotransport
AA
Diffusion
CYTOPLASMA of epithelial cell
di-, tri-peptidases
AA

ABSORPTION OF LIPIDS

Triglycerides (TAG)
Sterols (-esters)
Phospholipids (lecithin)

BILE ACIDS SALTS → EMULSIFICATION (+lecithin, +monoglycides)

Ø 1μm — LIPID DROPS

PANCREATIC LIPASE (colipase)
CHOLESTEROL-ESTHERASE
PHOSPHOLIPASE A_2
ENTERIC LIPASE

→ DEESTHERIFICATION

Glycerol FA MAG CH LFL

MICELLES — Ø 5nm, 20-30 molecules

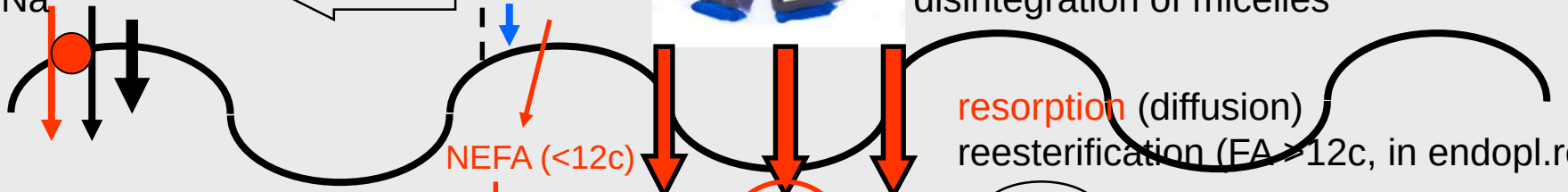
polar stratification, hydrophilic disintegration of micelles

unstirred water layer

bile acids

200-500μm

Na^+



resorption (diffusion)
reesterification (FA >12c, in endopl.retic.

NEFA (<12c)

CHE — TAG — PL — PROT.

GLYCEROL

CHYLOMICRA — Ø 10nm

capillaries

LYMPHATIC CIRCULATION (fenestration)

EXOCYTOSIS