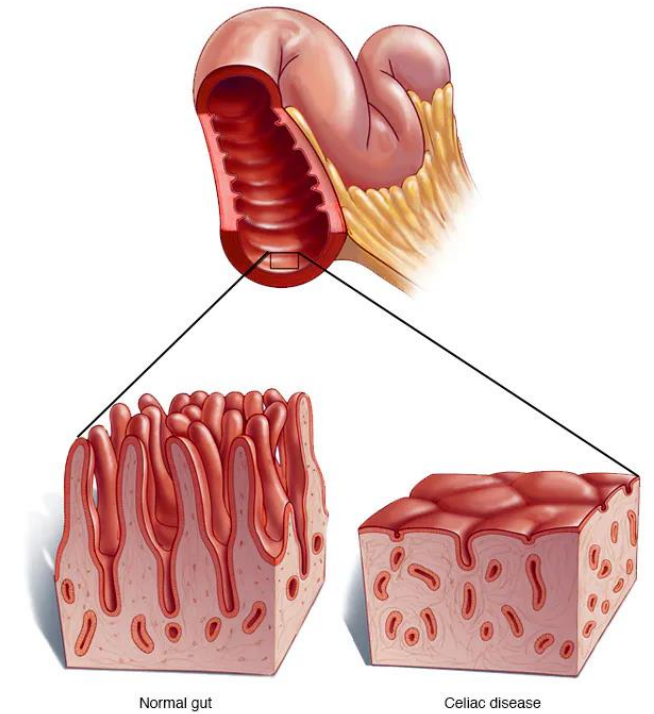


D- Xylose Absorption Test

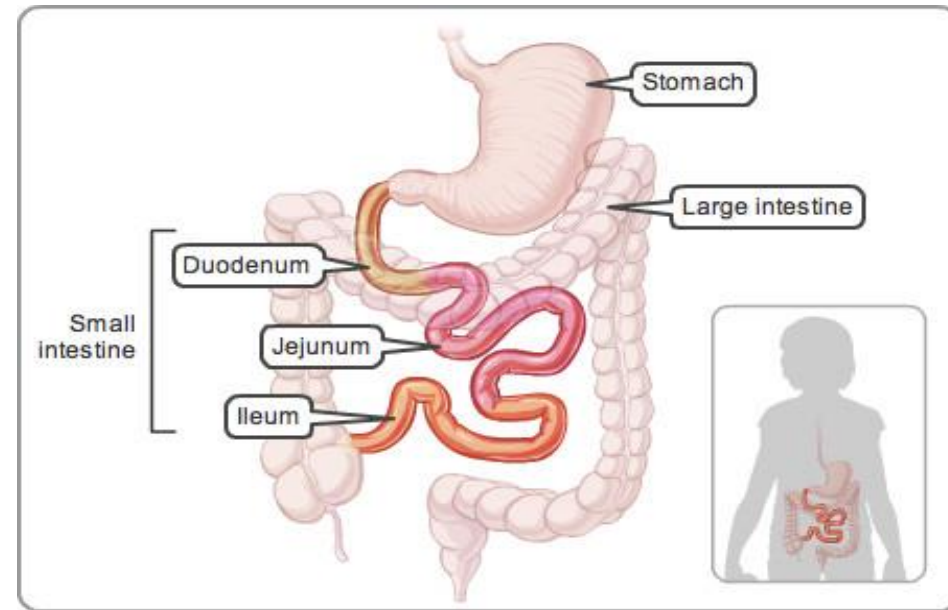


- Objectives

- To learn the technique of D-xylose absorption test and its relation to the function of the upper small intestine.
- To find out whether the malabsorption state of some patients is due to intestinal or pancreatic diseases.

- Introduction:

- The small intestine can be studied in **two parts** ,the upper small intestine and the lower small intestine.



•The best to test the function of the upper small intestine is →

(D- xylose absorption test)

•The best to test the function of the lower small intestine is →

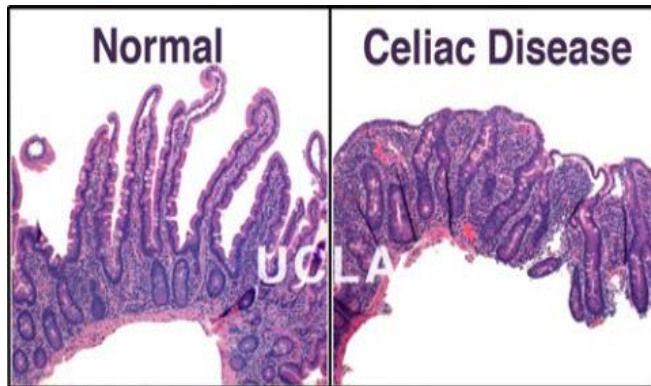
(Vitamin B12 absorption test)

D- Xylose Absorption Test

- D-Xylose is a type of aldopentose sugar found in plants:
 1. It is not metabolized in the body.
 2. It is **not** normally present in significant amounts in blood.
 3. It is normally easily absorbed by the intestine.

Note: Pancreatic digestive enzymes are not needed for D-Xylose absorption.

Impaired absorption of D- xylose occurs in conditions where there is ***flattening of the intestinal villi*** such as celiac disease and tropical sprue .



This results in

The test does of D-xylose **level in blood and urine will be low.**

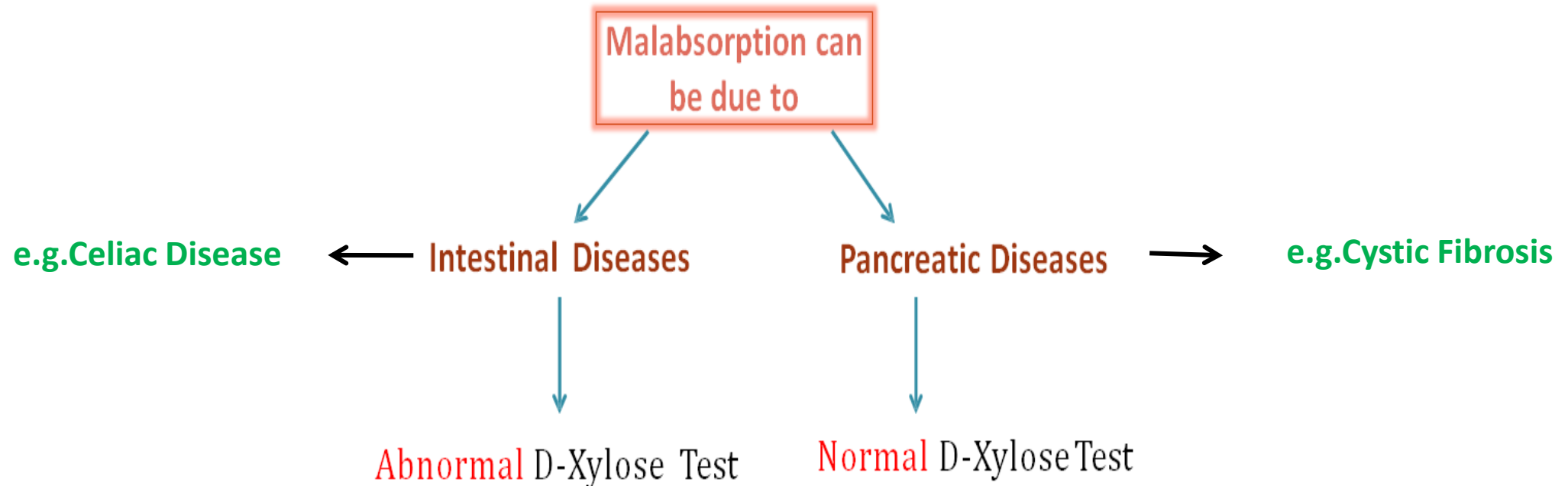
• ***Celiac disease*** is a serious autoimmune disorder that can occur in genetically predisposed people where the ingestion of gluten leads to damage in the small intestine.



• ***Tropical sprue*** is a disorder of unknown cause (infection..) affecting people living in tropical areas who develop abnormalities of the small intestine structure destruction of the villi.

- To do the test, D-xylose is administered orally, 60% is absorbed in the small intestine (duodenum and jejunum), most is subsequently excreted by the kidneys (about **25%** of the dose).
- **In adults**, the standard oral dose is **25 g** after which *the urinary output during the next five hours is 5.8 g in normal subjects.*
- **In children**, a **5g dose of D- xylose**, and the normal output in the urine is **1.25g.**

- The amount of D-xylose detected in urine or blood in a specified time interval after administration of a measured dose of D-xylose, is used to evaluate *malabsorption*.
- Also, it can be used to differentiate between malabsorption's two main different causes;



- **The accuracy of the D-Xylose absorption test is affected by two factors:**

1. Rate of Absorption by Intestine

2. Rate of Excretion by Kidneys

→ Thus, In case of impaired **renal function** the D-xylose level in a 5 hrs urine sample **is low** ,which can lead to *false diagnosis of celiac disease.*

In order to eliminate misinterpretations as a result of renal disease



A blood determination of D-xylose after 2 hours of the oral dose is carried out along with the determination of D-xylose in urine



A normal high blood D-xylose level in the presence of decreased urine D-xylose excretion suggest:

Normal Absorption due to normal intestine

Renal dysfunction

- Principle:

- D- xylose is a pentose which produces a brown complex with maximum absorption at 475nm when reacted with o- toluidine in the presence of acetic acid and heat.
- Hexoses also reacts with O- toluidine **but produce a different complex** with an absorption peak at 622 nm, this ensures that interference with glucose is minimum.

- Method:

- The patient/volunteer should keep **an over night fast**, in the morning empties the bladder and discards the urine.
- **Before breaking the fast, 25g of D-xylose in 250ml water is taken by mouth.**
- The patient /volunteer should then drink water at one and two hours after drinking the D-xylose solution .
- All urine passed during the next five hours is collected .

- Estimation of D-xylose in urine:

Label 7 test tubes:

	T1	T2	T3	T4	S1	S2	Blank
Urine 'A'	0.1 ml	0.1 ml					
Urine 'B'			0.1 ml	0.1 ml			
Standard					0.1 ml	0.1 ml	
dH2O							0.1 ml
O-toluidine reagent	7 ml						



Cover tubes by aluminum foil & mix the contents of each tube



Boiling water bath for 5 minutes



Cool the tubes for 1-3 min



Read absorbance at 475 nm against blank

- Results and Calculations:

Tubes	Absorbance at 475nm	Mean of abs
T1		
T2		
T3		
T4		
S1		
S2		

$$\text{Concentration of D}_x\text{ylose in urine} = \frac{\text{Mean abs of test}}{\text{Mean abs of std}} \times \text{Conc. of std.} \times \text{D. f}$$

- **Normal value:** 5.8-10 g / total volume collected
- **Abnormal value:** less than 2.5 g / total volume collected

- Example:

-Conc. Of Std.= 0.01 g/ml

Dilution factor= 10

Total volume = 5 ml

Mean Abs. sample = 0.843

Mean Abs. std.= 0.558

- Conc. Of urine D-xylose= $\frac{0.843}{0.558} \times 0.01 \times 10 = 0.151$ g/0.1 ml

= 0.151 g → 0.1 ml

? → 1 ml

= 1.51 g/ml

1.51 g → 1 ml

? → 5 ml

- Conc. Of urine D-xylose = 7.6 g/5 ml

Normal