

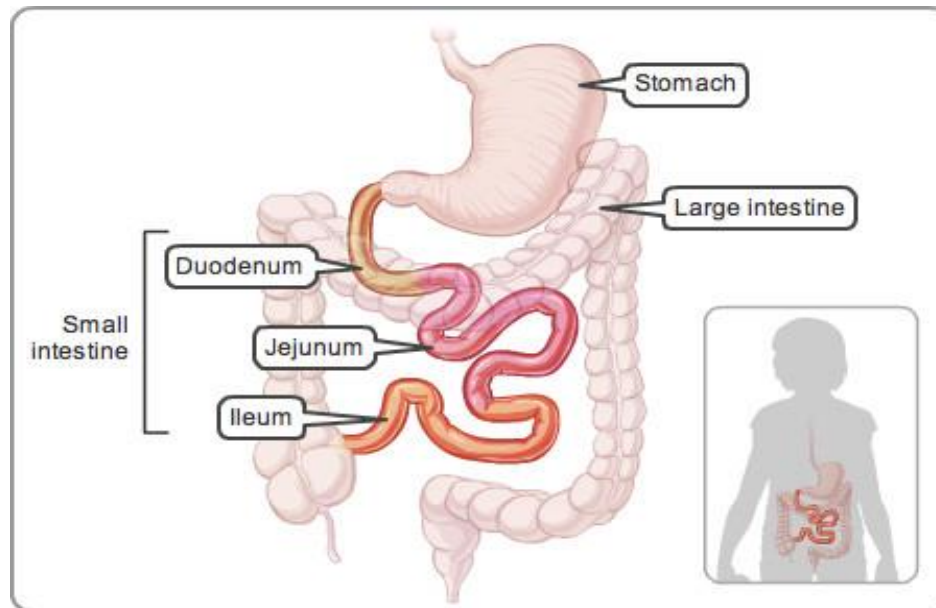
# **D- Xylose Absorption Test**

## - 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.



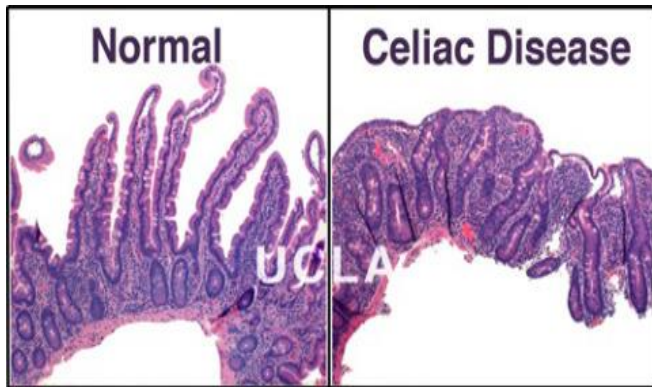
•The best to test the function of the upper small intestine is →

**(D- xylose absorption test )**

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

**(Vitamin B12 absorption test)**

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.

## D- Xylose Absorption Test

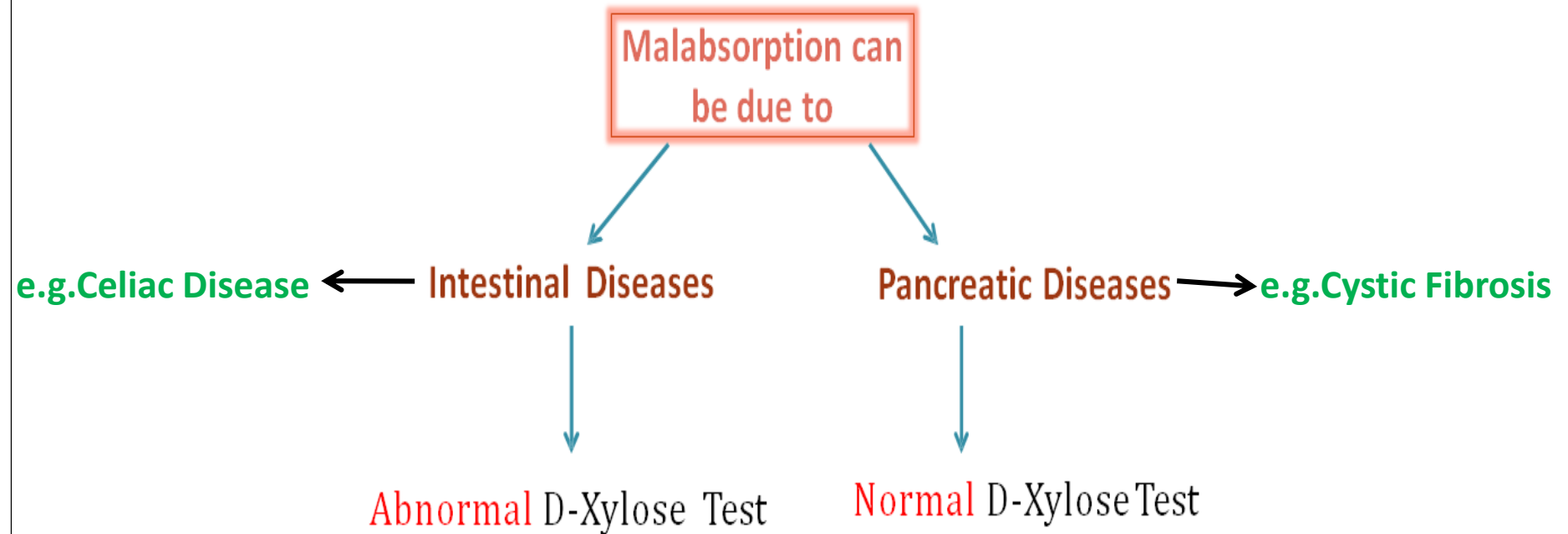
- D-Xylose is a type of aldopentose sugar found in plants:
  1. It is not metabolized in the body.
  2. It is **not** normally present in significant amounts in blood.
  3. It is normally easily absorbed by the intestine.

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

- 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 coeliac 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		

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

- **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=  $\frac{0.843}{0.558} \times 0.01 \times 10 = 0.151 \text{ g/0.1 ml}$

= 0.151 g  $\rightarrow$  0.1 ml

?  $\rightarrow$  1 ml

= 1.51 g/ml

1.51 g  $\rightarrow$  1 ml

?  $\rightarrow$  5 ml

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

Normal