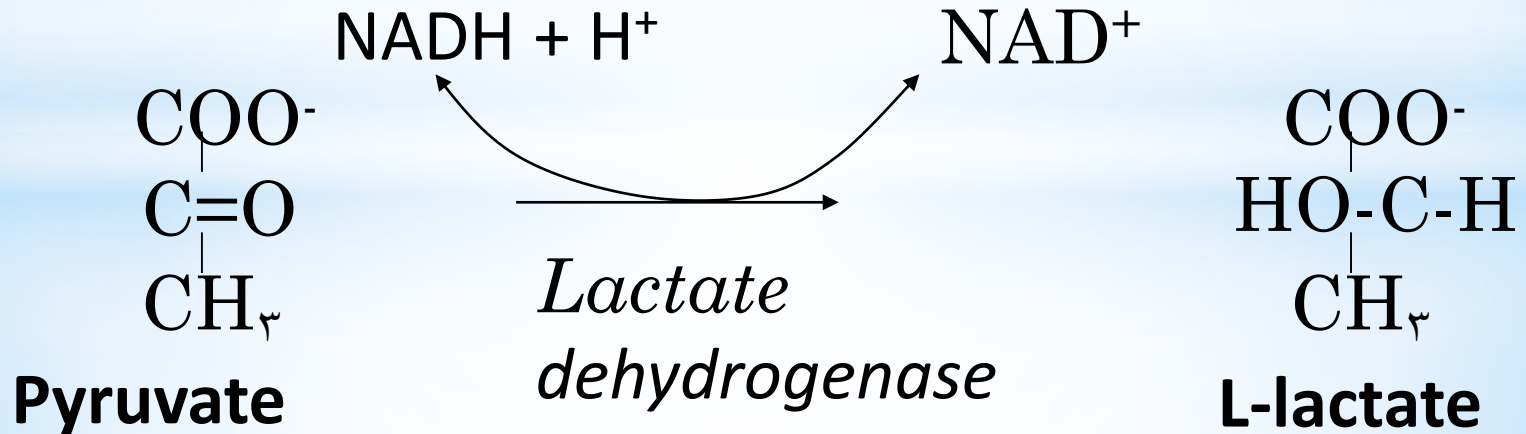


\* **Lactate dehydrogenase  
(LDH)**



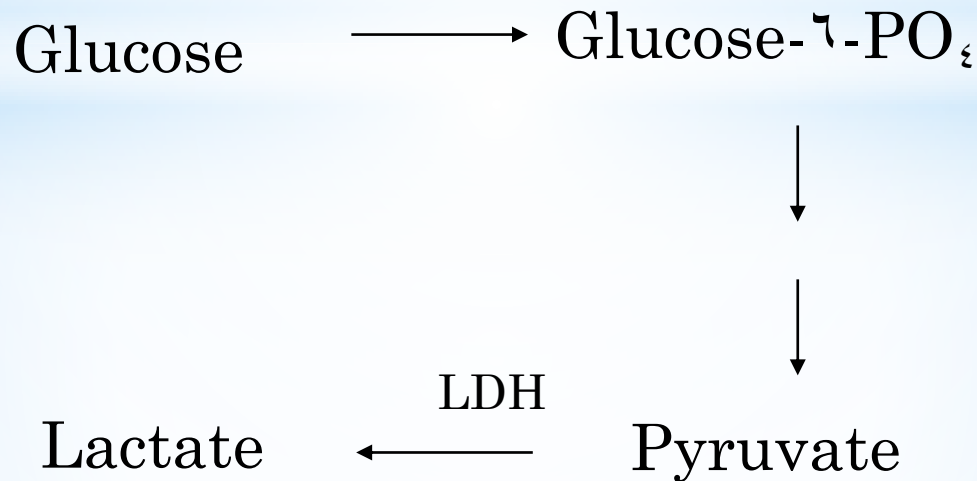
# *Lactate dehydrogenase*

is an enzyme that catalyzes the conversion of lactate to pyruvate.



- is responsible for creating energy from glucose for the cells in the body.
- The reaction catalyzed by lactate dehydrogenase is reversible.

This allows a cell to synthesize glucose from lactate, Converting lactate to glucose is **a major feature of gluconeogenesis**



## \* **Tissues source**

- It is not tissue-specific, being found in a variety of tissues, including liver, heart and skeletal muscle.
- it is cytoplasmic enzyme found in all cells of the body.
- The enzyme is composed of  $\xi$  subunits (tetramer) (composed of  $\xi$  poly peptide chains). The two most common subunits are the LDH-M and LDH-H protein respectively.
- the two subunits M (muscle) and H (heart).
- Various combinations of these two subunits result in  $\circ$  different isoenzymes.



# \* LDH isoenzymes

**LDH<sub>1</sub>**: This is composed of four H subunits (H<sub>4</sub>) and is found mostly in cardiac muscle and erythrocytes, as well as brain.

**LDH<sub>2</sub>**: This is composed of three H subunits and one M subunit (MH<sub>3</sub>). In white blood cells.

**LDH<sub>3</sub>**: This is composed of two H and two M subunits (M<sub>2</sub>H<sub>2</sub>).

In the lungs.

**LDH<sub>4</sub>**: This is composed of one H and three M subunits (M<sub>3</sub>H).

In the kidney, placenta, and pancreas. muscle

**LDH<sub>5</sub>**: This is composed of four M subunits (M<sub>4</sub>) and is found in skeletal muscle and the liver.



\* Usually LDH- $\gamma$  is the predominant form in the serum (30-47 %).

\* In case of presence of higher level of LDH- $\lambda$  than LDH- $\gamma$  (flipped pattern), **this suggest myocardial infarction.**

\* The use of this phenomenon to diagnose infarction has been largely superseded **by the use of troponin I or T measurement.**



# Value of test

- \*The LDH test is generally used to screen for tissue damage.
- \*This damage may be acute (as in the case of a traumatic injury)
  - \*or chronic (due to a long-term condition such as liver disease or certain types of anemia).
- \* It also may be used to monitor progressive conditions, such as muscular dystrophy and HIV.





# ❑ Clinical significance

## Elevated LDH

### Pathological increase:

1-Hemolysis

2-Liver disease

3-Muscle disease (muscular dystrophy)

4-heart diseases (myocardial infarction)

5-cancer

6-kidney failure

### Physiological increase:

1-Exercise.





# *Myocardial infarction*

It's normal for a person to have a higher level of LDH- $\gamma$  than LDH- $\alpha$ . But after a heart attack, the level of LDH- $\alpha$  rises and is usually higher than the level of LDH- $\gamma$ . This is called a flipped pattern.

- \* Total LDH level will rise within 24 to 72 hours after a heart attack and peak in two to four days. It will return to normal in about 10 to 14 days.
- \* A normal LDH-1/LDH-2 ratio is generally regarded as reliable evidence that a heart attack did not occur.



## *Liver disease*

- \*The isoenzyme LDH<sub>5</sub> increase in liver diseases.
- \*In liver cirrhosis or obstructive jaundice it is slightly elevated that it become 2 folds higher than normal range.
- \*In viral hepatitis it is moderate elevated that it increase up to 3 folds higher than normal.
- \*In hepatic toxic it is marked elevated that it increase up to 10 times higher than normal.



## ***Malignancy***

- \*The isoenzymes that increase are LDH $\xi$  and LDH $\circ$
- \*They are elevated up to 10 times higher than normal

## \* ***Muscular dystrophy***

- \*The isoenzyme that increase is LDH $\xi$



## \* Low levels

- You should know that low LDH levels in the blood are not indicative of any medical problem.
- At the most a low LDH reading may be a response to
  - \- high intake of vitamin C as ascorbic acid interfere in the LDH assay or genetic mutation.

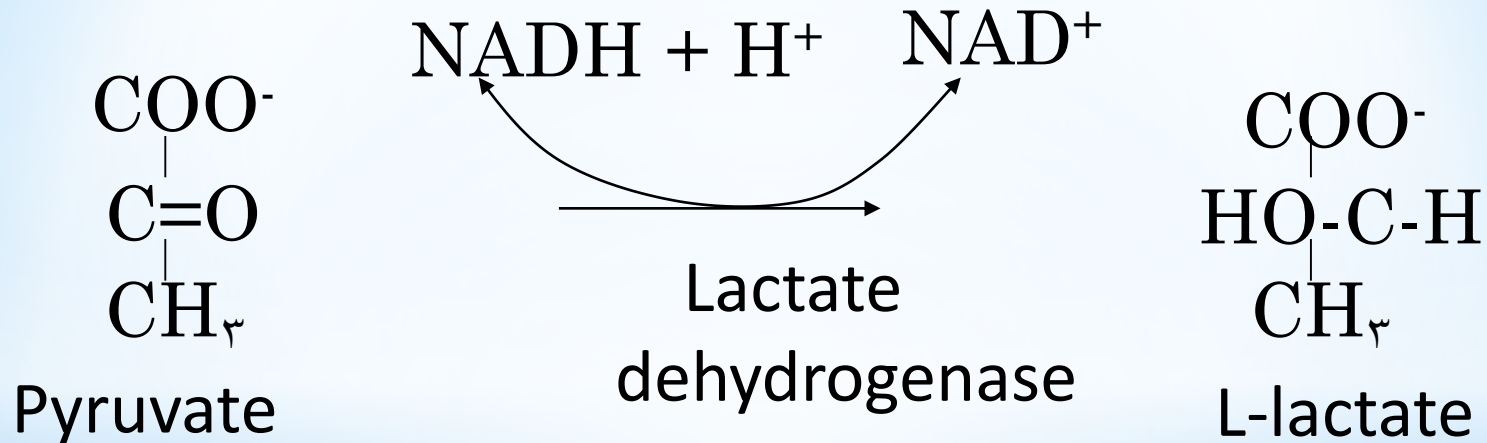


# NOTE

Because LDH is so non-specific and isoenzyme measurement is not routinely available, its measurement does not confer any additional information about skeletal muscle or hepatic disease, than that provided by enzyme assays routinely used for this purpose (i.e. CK for muscle and AST and ALT for liver)



# \* PRINCIPLE



- The initial rate of NADH oxidation is directly proportional to the catalytic LDH activity . It is determined by measuring the decrease in absorbance at  $\gamma\xi \cdot \text{nm}$ .



## \* **PROCEDURE**

- 1 ml W.R + 2 · μ sample.
- Mix, read initial absorbance at wavelength 38 · after 3 · sec and start timer. Read again after 1, 2 and 3 minutes.
- Determine the main absorbance change per minute.





# \* NORMAL VALUES

**Male** : up to 768 U/L

**Female** : up to 510 U/L

