



- The normal lactate : pyruvate ratio in the cell is 10:1
- Lactic acid has a pK value of about 4 → it is fully dissociated into lactate and $[H^+]$ at body pH.
- The end product of glycolysis is pyruvate → which is converted to lactate by pyruvate dehydrogenase.
- Lactic acidosis:
 - **Each day the body produces about 1500 mmol of lactate which enters the bloodstream and is metabolized mostly in the liver (only 30% is metabolized in kidneys):**
 - ✓ Cori cycle: with the use of muscles of the body → energy is needed → leading to production of lactate (25%) → this lactate will move to the liver → where half of it will be converted to glucose by gluconeogenesis while the other half is metabolized to CO_2 and water in the citric acid cycle.
 - ✓ Other sources of lactate:
 - ❖ Skin (25%).
 - ❖ RBCs (20%).
 - ❖ Brain (20%).
 - ❖ Intestine (10%).
 - ✓ Other tissues can use lactate as a substrate and oxidize it to CO_2 and water, but it is only the liver and kidneys which have the enzyme that can convert lactate to glucose.
 - **Hyperlactatemia:** it is defined as plasma lactate concentration of 2-5 mmol/L (due to abnormal conversion of pyruvate into lactate).
 - **Lactic acidosis:** it is a disease characterized by a $pH < 7.25$ and a plasma lactate > 5 mmol/L (due to an increase in blood lactate levels when body buffer systems are overcome).
 - **Causes of lactic acidosis:**
 - ✓ Excessive tissue lactate production.
 - ✓ Impaired hepatic metabolism of lactate.
 - ✓ It might also occur in association with the following underlying diseases:
 - ❖ Diabetes mellitus.
 - ❖ Alcoholic ketoacidosis.
 - ❖ Sever iron-deficiency anemia.
 - ❖ Liver diseases.
 - ❖ Renal failure.
 - ❖ Pancreatitis.
 - ❖ Short gut syndrome.
 - ❖ Malignancy.
 - ✓ Inborn errors of metabolism may be responsible for lactic acidosis:
 - ❖ G6PD.
 - ❖ Fructose-1,6-bisphosphate deficiency.
 - ❖ Pyruvate carboxylase deficiency.
 - ❖ Pyruvate dehydrogenase deficiency.
 - ❖ Oxidative phosphorylation deficiency.
 - ❖ Methylmalonic aciduria.
 - **Plasma lactate = 1 mmol/L. The renal threshold for lactate is about 5-6 mmol/L. Therefore, at normal plasma levels, no lactate is excreted into the urine.**
 - **There are two types of lactic acidosis:**
 - ✓ Type A lactic acidosis (common): when tissue oxygen delivery is inadequate (hypoxemia or anemia).
 - ✓ Type B lactic acidosis: carbohydrate metabolism is disordered.
 - **Management of lactic acidosis:** large doses of sodium bicarbonate.