# Chloride shift

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#### **Biochemical functions**

 Chloride is involved in the regulation of acid-base equilibrium, fluid balance and osmotic pressure.

These functions are carried out by the interaction of chloride with Na+ and K+. Chloride is necessary for the formation of HCI in the gastric juice. Chloride shift involves the active participation of Cl.

 The enzyme salivary amylase is activated by chloride.



## Dietary requirements

 The daily requirement of chloride as NaCl is 5-10 g. Adequate intake of sodium will satisfy the chloride requirement of the body.



### Sources

 Common salt as cooking medium, whole grains, leafy vegetables, eggs and milk



## Absorption In normal

• circumstances, chloride is almost totally absorbed in the gastrointestinal tract.



## Plasma chloride

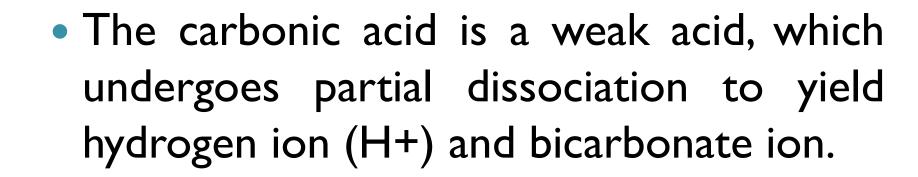
• The normal plasma concentration of chloride is 92-110 mM/|. Cerebrospinal fluid (CSF contains higher level of Cl-(120 mM/l). This is due to the fact that protein content is low in CSF and, therefore, Cl- is higher in order to maintain Donnan membrane equilibrium.



#### Excretion

 There exists a parallel relationship between excretion of chloride and sodium. The renal threshold for CI- is about 110 mEq/|. • The greater proportion (approx. 70%) of carbon dioxide is transported in the form of bicarbonates.

• The CO2 reacted with the water of the cytoplasm in the presence of enzyme carbonic anhydrase to form carbonic acid.



 The given reaction mostly occur inside RBCs, because the enzyme carbonic anhydrase is abundant there.  In RBCs, CO2 combines with water to from carbonic acid which dissociates to gives H+ ion and bicarbonate ion in the presence of carbonic anhydrase enzyme.

 The bicarbonate ion then diffuses outside the RBC in the plasma and combines with Sodium ions to from Sodium bicarbonate (NaHCO3).

- Loss of bicarbonate ions from RBC causes positive charge inside RBC which is balanced by diffusion of chloride (CI-) ion from plasma into the RBC.
- This exchange of CI- ion and HCO3- ion between plasma and RBCs is known as chloride shift.

- This phenomenon of chloride shift maintain the electrical neutrality of cell.
- This phenomenon is also known as **Hamburger** phenomenon.
- Reverse of chloride shift occurs in various tissues.

Source: U Satyanarayana