Kidney plays a critical role in acid-base homeostasis by the reabsorption of filtered bicarbonate (HCO$_3^-$) and the generation of new HCO$_3^-$.

In the proximal tubule, HCO$_3^-$ reabsorption occurs via the transcellular coupling of the apical Na$^+$/H$^+$ exchanger with the basolateral Na$^+$/(HCO$_3^-$) cotransporter, which plays a critical role in mediating electrogenic bicarbonate efflux. In the cortical distal nephron, acid secretion is primarily mediated by a vacuolar H$^+$-ATPase and H$^+$-K$^+$-ATPase located in the apical plasma membranes of type A-intercalated cells. Basolateral bicarbonate efflux is mediated by the anion exchanger AE1 in this cell type. In type B-intercalated cells, the vacuolar H$^+$-ATPase is located on the basolateral membrane. This cell type is thought to mediate collecting duct HCO$_3^-$ secretion via an apical anion exchanger pendrin. In addition to the Na$^+$/(HCO$_3^-$) cotransporter, which mediates electrogenic basolateral HCO$_3^-$ transport in the proximal tubule, other members of the Na$^+$/(HCO$_3^-$) cotransporter family have been identified and functionally characterized.

Renal ammonia excretion is the predominant component of renal net acid excretion. In the proximal tubule, the apical Na$^+$/H$^+$ exchanger is a major mechanism of preferential NH$_4^+$ secretion. In the thick ascending limb of Henle, the apical Na$^+$-K$^+$-2Cl$^-$ cotransporter is a major route to ammonia reabsorption and the basolateral Na$^+$/H$^+$ exchanger appears to be the basolateral NH$_4^+$ exit. The collecting duct is a major site for renal ammonia secretion. The Rhesus glycoproteins, Rh B Glycoprotein (Rhbg) and Rh C Glycoprotein (Rhcg), are recently recognized ammonia transporters in the distal tubule and collecting duct. The localization and function of these acid-base transporters in the kidney tubules are to be discussed.