

Desalination in the Esophagus of the Seawater Eel

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Summary

The osmotic permeability coefficient (P_{osm}) was obtained in the seawater eel esophagus as 3×10^{-6} ml/cm².hr.Osm. This value was much lower than those in tight epithelia, though the eel esophagus belongs to leaky epithelia; the tissue resistance being 70 ohm.cm². When the esophagus was bathed in normal Ringer solutions, no net ion and water fluxes were observed. On the other hand, when mucosal NaCl concentration was increased, Na⁺ and Cl⁻ ions were transported from mucosa to serosa following their electrochemical gradients. However, only Na⁺ or Cl⁻ concentration was increased, the net Na⁺ or Cl⁻ flux was much lower than the expected from simple diffusion, indicating that most of the Na⁺ and Cl⁻ fluxes are coupled mutually. Since NaCN and ouabain inhibited the net Na⁺ and Cl⁻ fluxes by 50%, a part of this coupled process appears to be linked with Na⁺-K⁺ ATPase. Furthermore, mucosal thiazide, bumetanide, amiloride and DIDS also inhibited both Na⁺ and Cl⁻ transport by 30%. These results suggest that at least 30% of the coupled NaCl transport is due to Na⁺/H⁺-Cl⁻/HCO₃⁻ double exchanger on the apical membrane of the esophageal epithelium. However the rest 70% of desalination can not be explained by the known transport systems.