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Epithelial sodium channel (ENaC) in GtoPdb v.2021.2

Israel Hanukoglu[1]

1. Ariel University, Israel

Abstract

The epithelial sodium channels (ENaC) are located on the apical membrane of epithelial cells in the kidney tubules, lung, respiratory tract, male and female reproductive tracts, sweat and salivary glands, placenta, colon, and some other organs [9, 13, 22, 21, 42]. In these epithelia, Na^+ ions flow from the extracellular fluid into the cytoplasm of epithelial cells *via* ENaC. The Na^+ ions are then pumped out of the cytoplasm into the interstitial fluid by the Na^+/K^+ ATPase located on the basolateral membrane [36]. As Na^+ is one of the major electrolytes in the extracellular fluid (ECF), osmolarity change initiated by the Na^+ flow is accompanied by a flow of water accompanying Na^+ ions [6]. Thus, ENaC has a central role in regulating ECF volume and blood pressure, primarily *via* its function in the kidney [37]. The expression of ENaC subunits, hence its activity, is regulated by the renin-angiotensin-aldosterone system, and other factors involved in electrolyte homeostasis [37, 30].

In the respiratory tract and female reproductive tract, large segments of the epithelia are composed of multi-ciliated cells. In these cells, ENaC is located along the entire length of the cilia that cover the cell surface [15]. Cilial location greatly increases ENaC density per cell surface and allows ENaC to serve as a sensitive regulator of osmolarity of the periciliary fluid throughout the whole depth of the fluid bathing the cilia [15]. In contrast to ENaC, CFTR (ion transporter defective in cystic fibrosis) is located on non-cilial cell-surface [15]. In the vas deferens segment of the male reproductive tract, the luminal surface is covered by microvilli and stereocilia projections with backbones composed of actin filament bundles [42]. In these cells, both ENaC and the water channel aquaporin AQP9 are localized on these projections and also in the basal and smooth muscle layers [42]. Thus, ENaC function is also essential for the clearance of respiratory airways, transport of germ cells, fertilization, implantation, and cell migration [15, 22].

Contents

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