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Claudins and paracellular transport in the proximal renal tubule

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Paracellular transport across the tight junction is a mechanism for transepithelial reabsorption of solutes in the renal tubule. However, whether paracellular transport is necessary and why it evolved is unknown. Recent studies have identified the paracellular channel, claudin-2, that is responsible for paracellular reabsorption of sodium in the proximal renal tubule. Knockout of claudin-2 in mice impairs proximal sodium and fluid reabsorption but is compensated by upregulation of sodium reabsorption in the loop of Henle. This occurs at the expense of increased renal oxygen consumption, tissue hypoxia, and increased susceptibility to ischemic acute kidney injury. It is concluded that paracellular transport acts as an energy saving mechanism to increase transport without consuming additional oxygen.

Keywords :
Epithelial transport, sodium, paracellular, tight junction, oxygen, acute kidney injury