

A Cl channel in the kidney regulated by Ca.

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Macula densa (MD) is a unique apparatus in the kidney, in which fluctuation of urinary Cl concentration regulates renal afferent arterial tone (tubulo-glomerular feedback). We have tried to substantiate the Cl channel contributing to this mechanism, differential display using RT-PCR was performed to microdissected ascending loop of Henle with or without MD. Eight fragments were amplified only in MD(+) tubules, which were not reported previously, but the fragments of Cl channel was not involved. ClC family member were detected by degenerate primer sets, resulting the presence of ClC3 in these tubules.

Thus we next investigated the mechanism of gating of ClC3 influenced by intracellular Ca concentration, since Ca signal transduction can be seen when the tubulo-glomerular feedback is on. ClC3 possesses at least two levels of gating, high conductance and low conductance. When intracellular Ca is in steady state, both conductances were active, while the rise in Ca to 200 nM abolishes high conductance and the rise to 1000 nM abolishes both conductance levels. We conclude that ClC3 could be localized in MD, which have two conducting pores regulated by the rise in intracellular Ca.