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Response of Collecting Duct Intercalated Cells in Ischemia-reperfusion Injury in the Rat Kidney

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Acute renal injury frequently leads to metabolic acidosis. However, the functional role of the collecting duct intercalated cells is not well known. The purpose of this study was to examine the response of intercalated cells to ischemia-reperfusion (IR) injury. IR injury was induced by clamping both renal arteries for 30 minutes and animals were sacrificed at 6 hours after the reperfusion. Sham-operated control rats underwent sham surgery without renal artery clamping. Histologic examination demonstrated cellular damage in the collecting duct as well as in the proximal tubule. In the collecting duct, a subset of cells was detached from the basement membrane. Detached cells were present predominantly in the outer medulla and in the inner medulla. Damaged cells were not observed in control kidneys. Immunohistochemistry identified that the damaged cells were type A intercalated cells. TUNEL-staining and transmission electron microscopic examination identified that many of the detached cells were undergoing apoptosis. The results demonstrate that IR injury induced cell specific collecting duct damage. Altered acid-secretion from specific damage to intercalated cells appears to contribute to the development of metabolic acidosis in acute renal injury.