

Primary Cilia in Acute Kidney Injury

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The primary cilium is a microtubule-based non-motile, hair-like organelle that is known to a mechano- and chemo-sensor. The primary cilium is made up of nine outer microtubule doublets (9+0 arrangement) with a modified centriole, known as the basal body. Defects of primary cilia are tightly coupled to many developmental defects, diseases and disorders. In the kidney, a single primary cilium is recognized on the apical surface of all renal tubular epithelial cells, with the exception of intercalated cells. It has been reported that primary cilia are associated with proliferation and differentiation of kidney epithelial cells under numbers of pathophysiological conditions, including polycystic kidney disease. Ischemia and reperfusion (I/R) injury in kidneys alters primary cilia length, and, furthermore, the outcome of transplanted kidneys is associated with the change of primary cilia length. Primary cilia length responds differently to I/R injury depending on the identity of the tubular segments and the progression of injury and repair. Recent several studies have demonstrated that the alteration of primary cilia length is associated with reactive oxygen species, ERK and Sec10. To get insight the role of primary cilia in the kidney diseases, I will provide a brief overview of the structure and function of primary cilia and some mechanisms in the alteration of primary cilia length based on our recent studies.