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Current Status of Exosomal Research and Its Clinical Implication in Kidney Disease

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Exosomes are extracellular vesicles generated by all cells and they carry nucleic acids, proteins, lipids, and metabolites. They are mediators of near and long-distance intercellular communication in health and disease and affect various aspects of cell biology.

The two major categories of extracellular vesicles are ectosomes and exosomes. Ectosomes are released through plasma membrane budding and are in the size range of ~50 nm to 1 μm. Exosomes originate from the endosomal pathway by the formation of the ESEs, LSEs, and ultimately MVBs, which contain ILVs.

Exosome mediates cell-to-cell communications, modulating cellular homeostasis, electrolyte/water balance, tubular regeneration, and inflammatory reactions in normal kidneys. However, exosome also affects disease progression by amplifying inflammation, inducing tubulointerstitial fibrosis or glomerular epithelial-mesenchymal transition.

Given the recent advancement in exosome isolation and analysis techniques, many studies have shown the diagnostic and therapeutic potential of EVs in various renal diseases, such as acute kidney injury, polycystic kidney disease, chronic kidney disease, kidney transplantation.