Exploring Glomerular Podocyte Proximal Tubule Communication via Exosomes/Microparticles

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Exosomes, or messages in a bottle, contain proteins and RNAs and are used as messengers to transport information in the body. The basic organization of a nephron, or the basic filtration unit in a kidney, where podocytes are located on the glomerulus (a filtration barrier) are a prime position to secrete exosomes into the urinary flow. It is known that in many early-stage renal diseases glomerular podocytes undergo characteristic changes in their morphologic organization. Recently it has been shown that due to the stress of renal disease, podocytes also develop what is known as apical microvillus transformation and that these apical microvilli are the source of producing microparticles found in the urine. The purpose of this experiment is to determine if podocytes secrete exosomes under stressed and unstressed environments in vitro or a cell culture environment. Three questions were asked in this experiment: do podocytes secrete exosomes under stressed and unstressed conditions in cell culture, what protein/RNA cargo do these exosomes contain, and can an exosome be delivered to a proximal tubule cell to deliver the protein/RNA message. The exosome isolates from the stressed and unstressed podocytes were shown to contain the protein nephrin. There is a known feedback system from the proximal tubules to the podocytes by protein based signaling; however, this finding suggests that there is also a feed-forward communication system between the podocytes and proximal tubules by the use of exosomes/microparticles.

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