

A functional role for cannabinoid receptors in the kidney proximal tubules

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The current obesity epidemic has led to an increased rate of many obesity related comorbidities such as Type 2 diabetes. This places considerable pressure on the health care system with increased rates of diabetes and obesity leading to numerous medical complications such as end stage renal failure. Endocannabinoids bind to a small number of identified receptors including Cannabinoid receptor 1 (CB1) and Cannabinoid receptor 2 (CB2), Transient receptor potential cation channel subfamily V member 1 (TRPV1) and the putative cannabinoid receptor, GPR55. The cannabinoid receptors although initially thought to be predominantly located in the brain and central nervous system, are located in a number of peripheral tissues. Importantly, despite their abundance in kidneys, the functional role of the endocannabinoid system in the renal system has largely been overlooked. This study aims to establish which cannabinoid receptors are expressed in rat kidney tissue and specifically in the proximal tubule *via* the cell line Human Kidney-2 (HK2), as well as the functional role of the cannabinoid receptors in HK2 cells. Using RT-PCR analysis of mRNA extracted from rat kidney and HK2 cells, it was found that all four cannabinoid receptors CB1, CB2, TRPV1 and GPR55 were expressed in these samples. Further, western blot analysis of protein samples determined that all receptors were expressed in kidney and proximal tubule samples. In addition, using HK2 and assessing cell viability using the MTT assay, it was found that the cannabinoid receptors significantly influenced cell viability in proximal tubule cells. In summary, we have characterised expression of cannabinoid receptors in kidney tissue and proximal tubule cells which will improve our understanding of how cannabinoid receptors influence normal kidney function.