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Using zebrafish to model acute kidney injury

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Acute Kidney Injury (AKI) results in a rapid loss of renal function and arises from a wide range of insults including reduced blood flow to the kidney, as well as exposure to toxins or some medications.If AKI progresses unchecked, it can lead to renal failure necessitating kidney dialysis or transplant – treatments which incur great costs to the patient and health care field alike. Zebrafish due to their simplified kidney structure provide a useful animal system in which to study AKI, allowing for interrogation of both the damage response and regenerative pathways. Furthermore, conserved nephron segmentation patterns and function allow for comparison with the mammalian kidney. Traditionally, regenerative studies have focused on the adult kidney to elucidate how a pre-constructed organ re-establishes itself after insult; however, analysis of these regenerative processes first requires injuring the tissue of interest. Currently, the zebrafish field utilizes antibiotic injections to induce AKI. While characterized in detail, this method is susceptible to variability, complicating the ability to compare data between different labs. Toaddress this issue we have begun generating transgenic zebrafish lines which will utilize segment specific promoter regions to drive targeted damage in conjunction with the nitroreductase-metronidazole system. Isolating injury to a specific cell type in this way will allow for more critical investigations of the signaling pathways involved during renal restoration. In the long term, ourmodels will be used for wide scale drug screens to identify molecules with potential clinical value for the treatment of AKI.

Biography

Robert McKee is a Graduate student in his third year at the University of Notre Dame and previously completed his Bachelor of Science at Saint Vincent College as well as a certificate in Biotechnology. His current projects in the Wingert Lab include creating the above mentioned transgenic line as well as interrogating a specific pathway involved in the development of the pronephros and regeneration of the adult mesonephric kidney.

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