

3-D Visualization in Science: A study of the microscopic and gross anatomy of the kidney *Katie Tower, Mylissa Kowalski Medical Illustration, College of Imaging Arts and Sciences, Faculty Mentor: * R. L. Doolittle, Department of Medical Sciences, College of Science *Dr. Paul Craig Professor of Biochemistry and Bioinformatics*

The intent of this project is to create a virtual environment of the kidney, focusing on the nephron in a 3-dimensional (3-D) medium. While some exploration has been done at the gross level, the proposed work is to be an innovative trip into the microscopic environment. Based on a thorough review of the known literature a series of images will be created using Maya 3-D which will then be converted into animations within QuickTime. The resulting animations will allow students to travel within a 3D environment deep inside the kidney. At first glance you will be presented with a view of the gross anatomy of the urinary system. Next you will travel further into the kidney to see the nephron (functional unit of the kidney). From there you will see structures such as the glomerulus (a bed of capillaries contained within the filtration unit of the nephron) and connecting nephric tubules in a way that has only been seen through scanning electron microscopy. Some of the histological detail to be created will include the endothelial lining of the afferent arteriole, extra-capillary podocytes (highly specialized cells outside the glomerular capillary), and Bowman's capsule and inner space. An additional focus will be placed on the epithelial cells of the tubules and their microvilli. Another goal of this project is to eventually illustrate the relationship of capillary bed deformation to particular diseases of the kidneys as seen, for example, in diabetes and a number of glomerulopathies. This is where a 3D microscopic view will prove to be advantageous in that all aspects of change would be apparent to the viewer at this level. A visual journey through the kidney will educate the learner on its structure and function. Creating a virtual, interactive, 3D view, in contrast to the standard view of the kidney anatomy, will help students at a variety of levels gain a further understanding of overall body anatomy and physiology.

Katie.Tower@gmail.com Mak15@yahoo.com