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Scanning Electron Microscopy Analysis of Murine Renal, Aortic, and Cardiac Tissue

Sarah E. Grev
Purdue University, sgrev@purdue.edu

Luke E. Schepers
Purdue University, lscheper@purdue.edu

Jennifer Anderson
Purdue University, ander934@purdue.edu

Craig J. Goergen
Purdue University, cgoergen@purdue.edu

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Sarah Grev, Luke Schepers, Jennifer Anderson, Craig J. Goergen
Weldon School of Biomedical Engineering, Purdue University

Scanning electron microscopy (SEM) is a tool that provides detailed insight into objects invisible to the human eye. As the name suggests, an electron beam is used to create an image down to the nanometer scale. The beam focuses on the surface of a sample using lenses in the electron column. In this project, we use SEM to study three types of murine tissue. First, we examine the glomerulus, found in the kidney, that is primarily responsible for filtering blood. Following a left renal vein (LRV) stenosis, SEM is used to observe changes to the glomeruli. Differences in the left and right kidney glomeruli are noted, with glomeruli appearing intact from the right kidney, while glomeruli from the left kidney are broken down. These findings are vital for preeclampsia studies, where these glomerular changes are likely a result of renal ischemia induced by the LRV stenosis. Second, cross sections of the murine descending aorta with a type B aortic dissection are examined under SEM. High magnification images reveal the morphology of red blood cell types in the false lumen. These findings will be used for studies in evaluating medical interventions for aortic dissection. Third, we examine tissue from the left ventricle and atrium of the murine heart. SEM can be used to detect if hypertrophy caused by transverse aortic constriction causes changes to cells lining the endocardium. This project demonstrates that SEM provides high resolution and magnification images, revealing new information that is pivotal to current and future biomedical studies.

Keywords: Scanning Electron Microscopy, Glomerulus, Aortic Dissection, Transverse Aortic Constriction