

## 2007 Ohio Student Research Forum

Wright State University  
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## RESEARCH ABSTRACT FORM

**TITLE:** Architectural and Morphological Analysis of Mammalian Renal Arteries Using High Resolution Scanning Electron Microscopy (HRSEM)

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Over 84,000 deaths occurred as a result of kidney failure in 2004 alone and it is believed that this number will continue to rise. The two leading causes of kidney disease and failure are diabetes and hypertension (National Institute of Diabetes and Digestive and Kidney Disease). In order to improve kidney disease treatment and prevention, understanding renal vascular structure and function is essential.

In this study, renal arteries were collected from pigs ranging from six to nine months of age. The arteries were sealed and transected using medical shears as a saline solution flowed through the arteries to simulate blood flow. To test the integrity of the seal a subset of arteries were subjected to a burst pressure test, which was used to determine the pressure at which the seal failed or leaked. Arteries that were sealed and pressure tested were compared to arteries which were sealed but not pressure tested by high resolution electron microscopy (HRSEM) in order to compare the architecture, structure and morphology of the artery at the seal. The arteries were critical point dried, gold sputtered, and examined under Hitachi S-4800 HRSEM at 30, 50 and 100 magnification under vacuum, with beam emission ranging between 5 and 15 kilovolts. Topographic and morphometric comparison of the images obtained by HRSEM gave insight on the vessel composition, sealed areas, burst areas, and general structure of the arteries. By using a high magnification electron microscope, porcine renal arteries were able to be seen in vast detail revealing the changes that took place in the artery before and after it was sealed.