

# 657: Vascular Mapping in the Porcine Bladder Using Chromometric Analysis

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## Hypothesis/Aims of Study

- Acute bladder ischemia has not been studied to the same extent as chronic ischemia, resulting in a knowledge gap
- With little evidence on the effects of acute ischemia, it may affect bladder function more than anticipated

### Hypothesis:

- Pig bladders are composed of two hemispheres that are primarily fed by separate vesical arteries

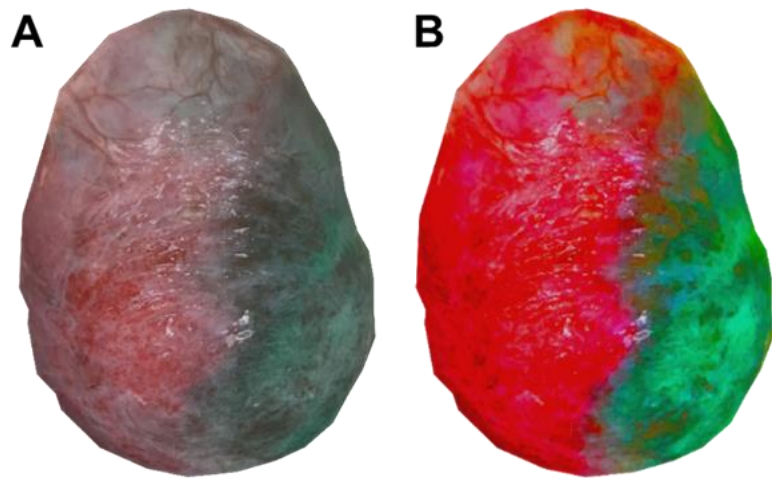
## Study Design & Methods

- Pig bladders with their associated vasculature were harvested immediately after slaughter
- Bladders were placed in a warm, humidified chamber and filled through the catheter to a volume 250 mL
- One vesical artery was perfused with 50 mL of green dye (food coloring in water) at 10 mL/min
- The other vesical artery was perfused with 50 mL of red dye
- Photographic images were collected during the dyeing process (Fig 1A)
- All images were cropped to remove the background and then divided into equal halves along the midline
- Chromometric analysis was performed on all images using a custom algorithm to quantify the average hue of each half
- In addition to chromometric analysis of the original images, color saturation was maximized to enhance visualization of the red and green regions (Fig 1B)

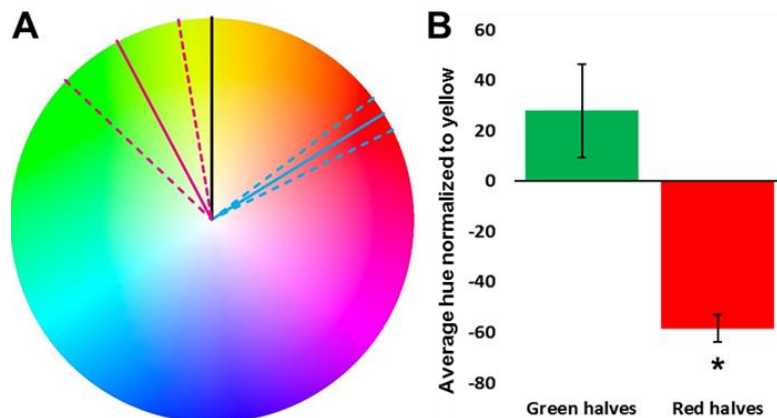
## Results

- Bladders from five pigs were studied
- Hue values were normalized to yellow, because yellow is midway between green and red on the hue, saturation, brightness color wheel (Fig 2A)
- Average normalized hues of the green and red halves were  $28^\circ \pm 5^\circ$  and  $-58^\circ \pm 19^\circ$ , respectively (Fig 2)
- Perfusion of different dyes into each artery produced bladders that demonstrated statistically different color patterns (Fig 2,  $n = 5$ ,  $p < 0.05$ )

## Figures



**Figure 1:** A. Photo of a bladder after perfusion. B. Image from panel A with enhanced saturation



**Figure 2:** A. HSB (hue, saturation, brightness) wheel with yellow set as a vertical reference (black line), with the average hues of the green side (magenta lines  $\pm$  dashed lines) and red side (cyan lines  $\pm$  dashed lines) compared for reference. B. The average hues for the green and red halves of the bladder were significantly different ( $n=5$ , \*  $p < 0.05$ ).

## Interpretation of Results and Concluding Message

- The results of this study support the hypothesis that pig bladders are composed of two hemispheres that are primarily fed by separate vesical arteries
- Chromometric analysis of porcine bladder vasculature demonstrated a lack of collateral vesical blood flow
- This provides evidence that the bladder might be more affected by a vascular compromise of one the vesical arteries than previously expected
- Further studies are needed studying effects of unilateral and bilateral acute ischemia on bladder biomechanics