

# Terrestrial Mammal Study

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# Terrestrial Mammal Health Study

- Raccoons
  - Omnivorous
  - Range and habits include interaction with water
  - Stable population
  - Adequate size for sampling



# Terrestrial Mammal Health Study

- Objective
  - To determine if differences exist between animals captured at the ash spill site versus a control site



# Terrestrial Mammal Health Study

- Differences in what?
  - Complete blood counts
  - Plasma biochemistry panels
  - Pathologic lesions
  - Tissue concentrations of toxins



# Terrestrial Mammal Health Study

- Procedures in 2009 & 2010
  - 10 raccoons trapped at ash spill site
  - 5 raccoons trapped at control site



# Terrestrial Mammal Health Study

- Procedures
  - Animals are anesthetized
  - Blood samples collected
    - CBC
    - Plasma biochemistry
    - Toxin panel analysis (PACE)
    - Possible hormone analysis



# Terrestrial Mammal Health Study

- Procedures
  - Animals are humanely euthanized and complete necropsies are performed
  - Tissues collected for toxin analysis and histopathology (microscopic examination)



# Terrestrial Mammal Health Study

- Goals
  - To determine if differences exist between exposed and control animals
  - To determine if antemortem samples (hair, blood) can be used for long term monitoring of toxin exposure



# Terrestrial Mammal Health Study

- Analysis of Results
  - Analysis of Variance (ANOVA) for blood results
    - Bonferroni post-hoc
  - Chi square or Fisher's Exact for histopath lesions



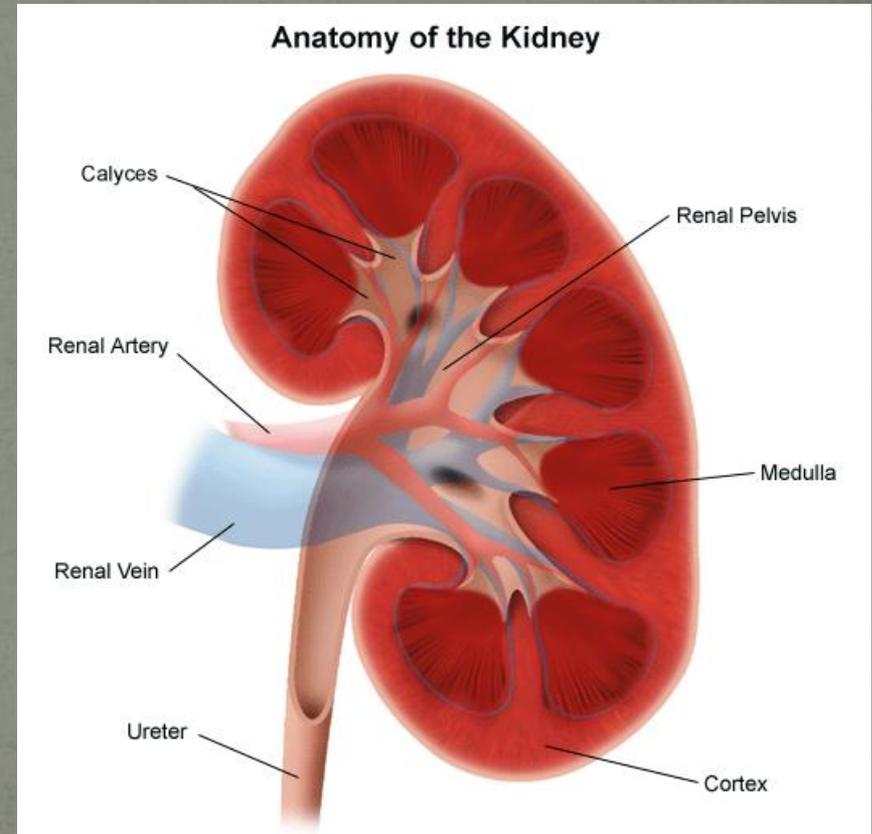
# Terrestrial Mammal Health Study

- Complete Blood Count
  - RBC ( $p = 0.049$ )
    - 2009  $\neq$  2010
    - Control  $9.4 \pm 1.1$
    - 2009  $8.7 \pm 0.67$
    - 2010  $9.8 \pm 0.93$
  - HCT ( $p = 0.009$ )
    - 2009  $\neq$  2010
    - Control  $35.9 \pm 4.3$
    - 2009  $32.2 \pm 3.4^*$
    - 2010  $38.3 \pm 3.7$



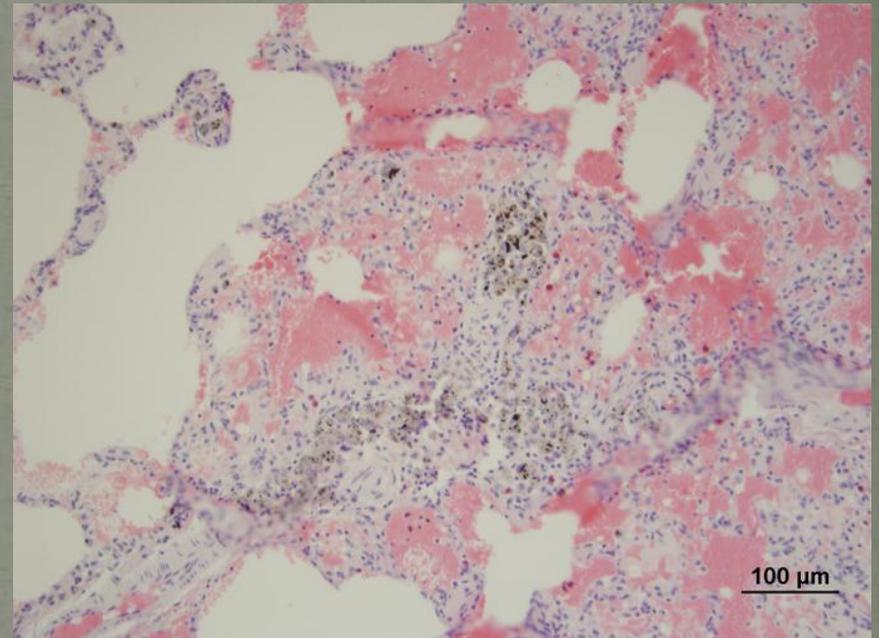
# Terrestrial Mammal Health Study

- Plasma Biochemistry
  - Creatinine ( $p = 0.0016$ )
    - 2009  $\neq$  2010
    - Control  $0.42 \pm 0.11^*$
    - 2009  $0.29 \pm 0.16^*$
    - 2010  $0.57 \pm 0.18^*$

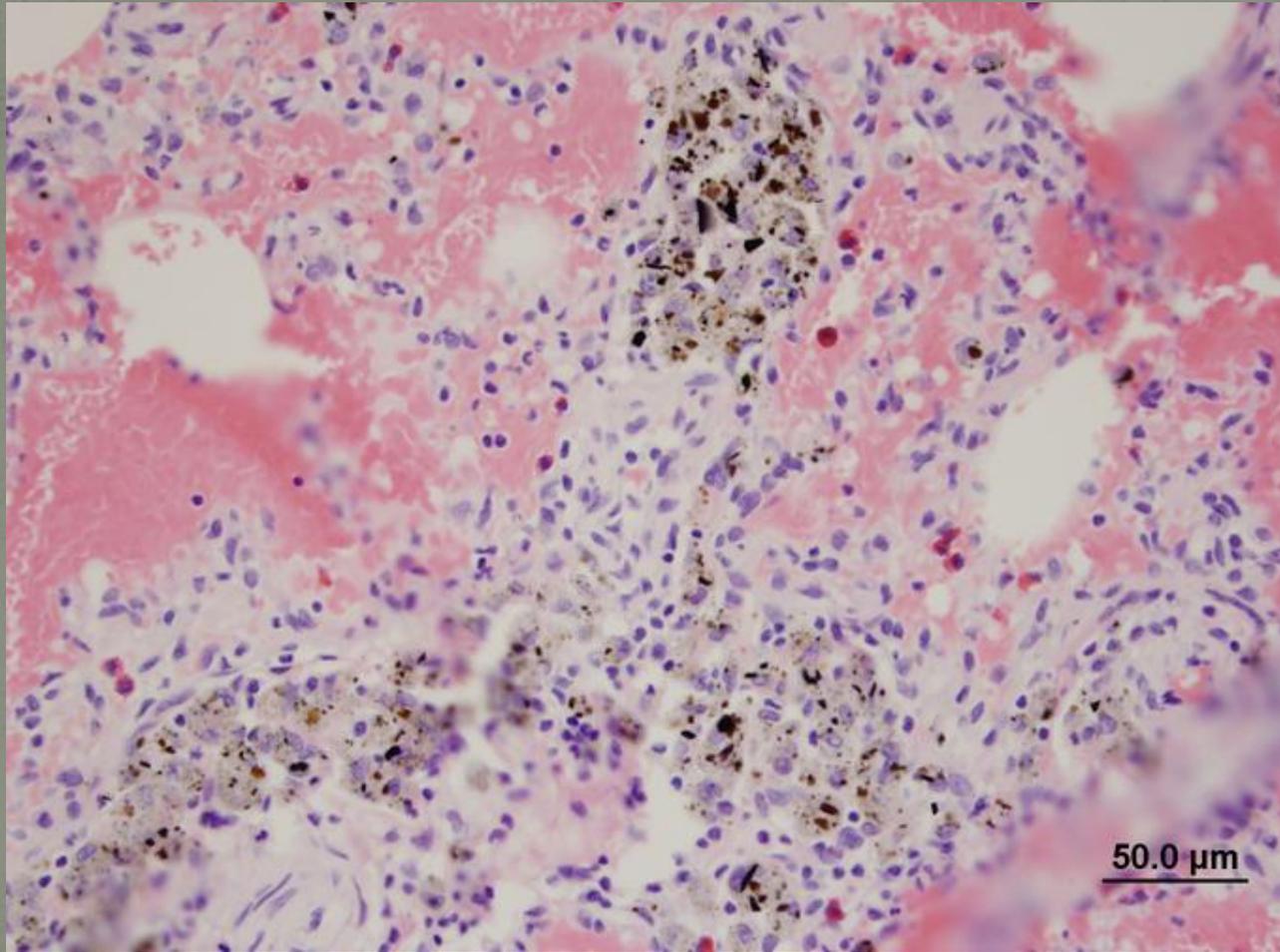


# Terrestrial Mammal Health Study

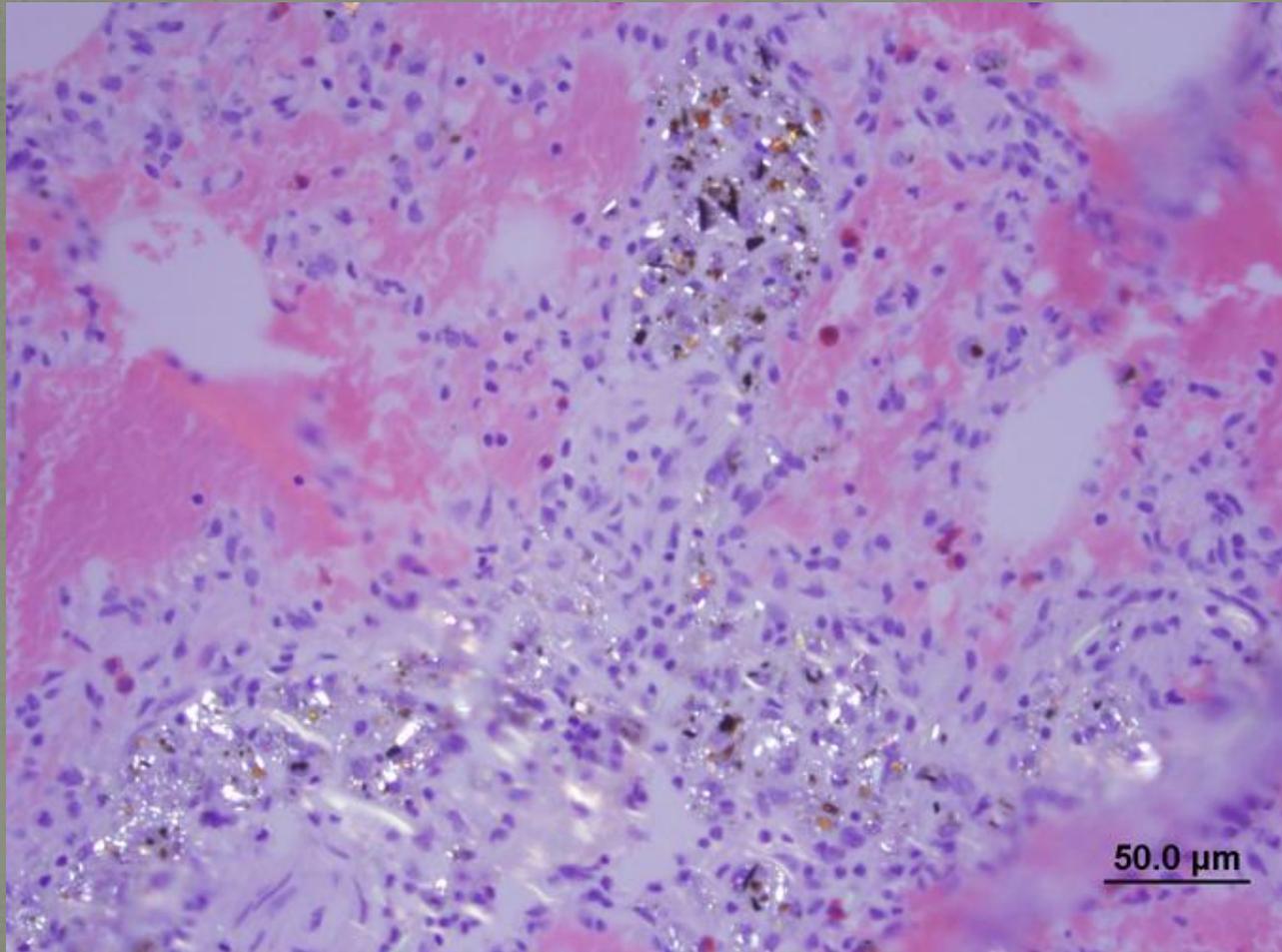
- Pathology
- Lesions observed on histopathology
  - Anthracosis
  - Pulmonary eosinophilic pneumonia
  - Portal fibrosis
  - Interstitial hypertrophy
  - Pulmonary fibrosis/granulomas



# Terrestrial Mammal Health Study



# Terrestrial Mammal Health Study



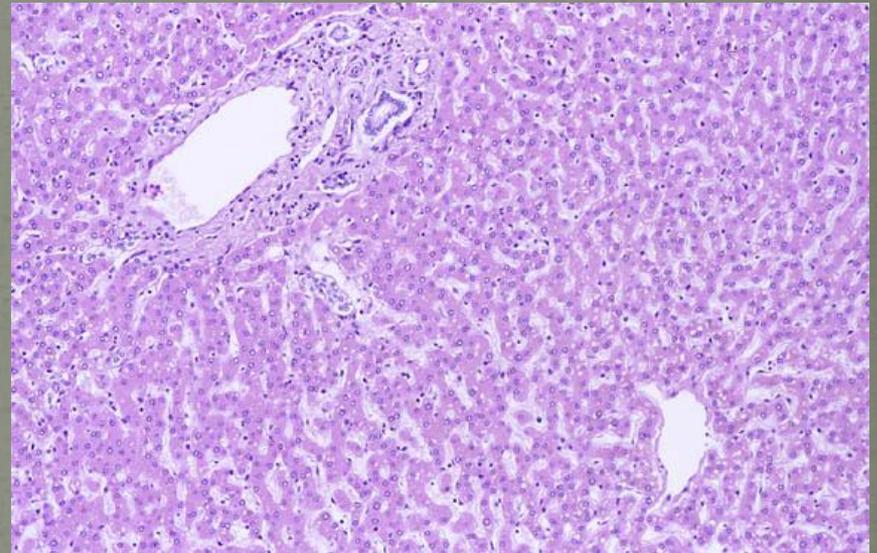
# Terrestrial Mammal Health Study

- But.....
- No significant differences between 2009 & 2010 animals
- No significant difference between exposed and control animals



# Terrestrial Mammal Health Study

- Tissue Toxins
  - ANOVA with Bonferroni post-hoc
  - Still need to analyze
  - 30 animals
    - 7 types of tissue
    - 26 toxins



# Terrestrial Mammal Health Study

- Conclusions
  - Nothing too exciting so far...
    - CBC & Chemistry
    - Pathology
    - Tissue toxin analysis still pending



# Terrestrial Mammal Health Study

- Next step
  - Determine if hair and blood correlate with toxin levels in target organs
  - Collect 10 raccoons each year at the spill site for 5 years
    - Hair, blood, microchip and then release



Questions?

