Seeing Spots & Spirals: Cheetahs, *Helicobacter* & Gastritis

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Gastritis in Cheetahs

Eaton et al, 1991 & 1993
What everyone knows about cheetahs
Cheetahs are the paradigm for lack of fitness due to homogeneity

O’Brien et al 1983 & 1985
Cheetahs as a Model?
### Lesion Frequencies in Free-ranging and Captive Cheetah Populations

<table>
<thead>
<tr>
<th>Lesion</th>
<th>Free-ranging Namibian cheetahs</th>
<th>Captive SA cheetahs</th>
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<td>N = 76</td>
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<td>7/62 (11%)</td>
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Munson et al, 2005
Its not just the bacteria

- No “HOT” strain of *Helicobacter* associated with gastritis

- No difference in virulence factors for *Helicobacter*
  - Urease
  - *cagA*, *vacA*

Terio et al, 2005
Helicobacter is necessary

• Not all captive cheetahs get gastritis
Is it the host?

- Similar genetic background
- Why are captive cheetahs different?
Associations with Gastritis

• **Etiologic**
  - *Helicobacter*
  - NSAIDs

• **Host**
  - Genetics (TLR / IL polymorphisms)
  - Microbiome*
  - Immune response*

• **Lifestyle**
  - Cigarette smoking / Alcohol
  - Diet
  - Chronic life “difficulties”
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### Evidence for Stress?

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<td>Adrenal hyperplasia</td>
<td>2/23 (9%)</td>
<td>13/14 (93%)</td>
<td>20/36 (56%)</td>
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Terio et al, 2004; Munson et al 2005
Evidence for Stress?

Corticoids (ng/g dry feces)

Wild Captive Cheetah Population

N = 40

Terio et al, 2004
If captivity stress contributes to disease development

THEN

wild cheetahs with *Helicobacter* should develop gastritis in captivity
Stress and the Gut

- Altered motility
- Increased permeability
- Decreased healing/blood flow
- Altered secretions
- Altered gut microbiota
- Altered immune function
Can intermediate parameters be measured that support a link between chronic stress and gastritis?
Immunophenotyping

Terio et al, 2012
Temperament & Management?
Can we really impact disease?

- Since 2010: overall prevalence 79% - down from 99%
  - 21% captive cheetahs with *Helicobacter* & no gastritis
- No change in prevalence of more severe gastritis
A Zoobiquitous Approach
This study was made possible through support from **Morris Animal Foundation**, the global leader in supporting science that advances veterinary medicine.

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