Serological evidence of MERS-CoV antibodies in dromedary camels (Camelus dromedarius) in Laikipia County, Kenya

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PLoS One, in press: reference available tomorrow!
What is MERS-CoV?

- Middle East respiratory syndrome coronavirus
- A betacoronavirus, related to severe acute respiratory syndrome (SARS-CoV) and other coronaviruses
- Origin is likely bats?
- Camels a likely virus reservoir, or at least a liaison host
- In the Middle East MERS-CoV has zoonotic potential

Camels as reservoir

- Several studies have found an epidemiological association between camels and human cases in the Middle East

- MERS-CoV antibody and virus have been detected in dromedary camels in the Arabian peninsula

Where is human MERS?

Where is camel MERS?
Kenya?

West of Rift Valley
(Turkana camels)
camel density
0.3-1.0 camels/km²

East of Rift Valley
(Rendille & Somali camels)
1.3-3.8 camels/km²

n=774 samples collected 1992 - 2013

Our study site

Cross-sectional study in Laikipia County in June-August 2013

Serum collected from 335 camels in 9 herds, broadly representative of the Laikipia camel population

Part of a wider camel health survey, incl demography, management, degree of isolation

4-8ml blood sample collected from the jugular vein

Transported on ice, centrifuged and serum separated and frozen at -20°C

Samples were shipped on dry ice for testing at Erasmus University, Netherlands:

Serum samples tested at a 1:20 dilution for presence of IgG antibodies reacting with MERS-CoV, SARS and human coronavirus (HCoV) (Reusken et al) in a antigen microarray
### Results

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Prevalence</th>
<th>C.I</th>
<th>P value</th>
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</thead>
<tbody>
<tr>
<td>Adult &gt;2 Years</td>
<td>61% (197)</td>
<td>54.2-68.3</td>
<td>0.09</td>
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<tr>
<td>Juvenile 6-12 Months</td>
<td>21% (71)</td>
<td>12.3-32.4</td>
<td>&lt;0.05</td>
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<tr>
<td>Young &lt;6 months</td>
<td>39% (57)</td>
<td>0 -98.7</td>
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<td><strong>TOTAL</strong></td>
<td><strong>47% (335)</strong></td>
<td><strong>41.7-52.7</strong></td>
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</tbody>
</table>

No effect based on herd management type (p=0.1) and herd isolation (p=0.6)
Conclusions

High MERS-CoV exposure in camels provides support for the need of further research on the role of camels in the epidemiology of the disease

High prevalence in the Laikipia herd, long term presence of virus in Kenya

Exposure in animals that have been born and raised locally – local transmission of MERS-CoV

No apparent animal health effects of these infections; no knowledge of when exposure occurred – but likely in young animals
Recommendations

Don’t panic!

It seems *probable* that MERS-CoV is a widespread in Kenyan (?) camel populations, and has been for many years

Effect on camels is similar to common cold

To understand the zoonotic implications of this, we need to understand what the virus is in Kenya, and how it compares to others

Therefore, placing virus diversity in a regional context is vital

We need to isolate virus and undertake a genetic epidemiology study

Further studies on the zoonotic implications should focus on MERS-CoV exposure in humans (eg risk groups) with and without camel contact
Next steps

Design and implement a genetic epidemiology study
Undertake a cross-sectional study of potential at-risk groups
Establish routine MERS-CoV serology in Kenya
Establish information exchange with stakeholders
Thanks for your attention!

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