Detection of Hepatitis C Virus (HCV) in semen from HIV-infected men who have sex with men (MSM) during acute HCV infection

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Disclosure of interest

• No financial disclosures to report.

Epidemic of HCV in HIV-MSM

European AIDS Treatment Network (NEAT)

Transmission via semen?

Sexual transmission of HCV in HIV-MSM

• Traditional view = HCV transmission via parenteral exposures

• HOWEVER: distinct absence of parenteral risk factors (eg. IDU)

• Incident HCV-infection associated with:
  - Receptive unprotected-anal-intercourse (UAI) 1,2,3
  - Receptive UAI with ejaculation (but not without) 4
  - Douching prior to anal intercourse 1

Aim of study

• To compare levels of seminal HCV between HIV-infected MSM with acute & chronic HCV infection.

HCV in semen

• 15-20 studies

• Detection rates: 12-36% (chronic-HCV)

• Detection of HCV in semen associated with:
  - ? HIV-infection 5,6
  - ? Blood HCV viral load (VL) 5,7
  - ? Acute HCV infection 8

• Acute infection poorly characterized
Methods

HIV-infected MSM from New York City

HIV-MSM with Acute-HCV

HIV-MSM with Chronic-HCV

- 3 x paired semen + blood samples taken at 2 weekly intervals
- HCV viral load quantified using qRT-PCR platforms:
  - Semen - Abbott m2000 [LLOQ 12 IU/mL]
  - Blood - Roche COBAS AMPLICOR [LLOQ 43 IU/mL]

Results

- Baseline characteristics
  - No. of participants
    - Acute: 21
    - Chronic: 12
  - Median age (IQR)
    - Acute: 36 (31-46)
    - Chronic: 52 (38-55)
  - HCV infection
    - Primary
      - Acute: 17
      - Chronic: 12
    - Re-infection
      - Acute: 4
      - Chronic: 0
  - Genotype (%) 1a
    - Acute: 20 (95)
    - Chronic: 9 (75)
  - Median blood HCV VL
    - Acute: 5.5 (3.8-6.2)
    - Chronic: 6.6 (6.2-6.9)
  - Median ALT, U/L (IQR)
    - Acute: 231 (87-492)
    - Chronic: 62 (46-105)

- Detection of seminal HCV
  - No. of participants (%)
    - Detected: 11 (33)
    - Not detected: 12 (67)
  - No. of semen samples (%)
    - Detected: 16 (27)
    - Not detected: 43 (73)
  - Median Age (IQR)
    - Detected: 43 (35-49)
    - Not detected: 37 (33-46)
  - HCV Status
    - Acute HCV (%)
      - Detected: 8 (21)
      - Not detected: 30 (79)
    - Chronic HCV (%)
      - Detected: 8 (38)
      - Not detected: 13 (62)
  - Median blood HCV VL
    - Acute: 6.4 (6.2-6.9)
    - Chronic: 5.5 (4.3-6.4)
  - Median ALT, U/L (IQR)
    - Detected: 107 (66-507)
    - Not detected: 99 (60-222)

Results – Baseline characteristics

<table>
<thead>
<tr>
<th></th>
<th>Acute</th>
<th>Chronic</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of participants</td>
<td>21</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td>Median age (IQR)</td>
<td>36 (31-46)</td>
<td>52 (38-55)</td>
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<td>HCV infection no.</td>
<td>17</td>
<td>12</td>
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<td>Re-infection</td>
<td>4</td>
<td>0</td>
<td></td>
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<tr>
<td>Genotype (%)</td>
<td>1a</td>
<td></td>
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</tr>
<tr>
<td>Median blood HCV VL</td>
<td>5.5 (3.8-6.2)</td>
<td>6.6 (6.2-6.9)</td>
<td>0.006</td>
</tr>
<tr>
<td>Median ALT, U/L (IQR)</td>
<td>231 (87-492)</td>
<td>62 (46-105)</td>
<td>0.001</td>
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</tbody>
</table>

Results – Detection of seminal HCV

<table>
<thead>
<tr>
<th></th>
<th>Detected</th>
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<tr>
<td>No. of participants (%)</td>
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<td>Median Age (IQR)</td>
<td>43 (35-49)</td>
<td>37 (33-46)</td>
<td>0.256</td>
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<td>HCV Status</td>
<td>Acute HCV (%)</td>
<td>Chronic HCV (%)</td>
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<tr>
<td>Median blood HCV VL</td>
<td>6.4 (6.2-6.9)</td>
<td>5.5 (4.3-6.4)</td>
<td>0.002</td>
</tr>
<tr>
<td>Median ALT, U/L (IQR)</td>
<td>107 (66-507)</td>
<td>99 (60-222)</td>
<td>0.302</td>
</tr>
</tbody>
</table>

Discussion

- No significant differences between acute & chronic seminal HCV measures
- Results comparable to previous studies
- Seminal HCV levels likely determined by corresponding blood HCV level
- Blood HCV levels are highest during early ‘acute’ HCV
  - Increased infectiousness

Results – Semen & Blood HCV VLs

- Median seminal HCV VL
  - Acute: 1.32 log_{10} IU/mL
  - Chronic: 1.77 log_{10} IU/mL
  - P = 0.163
- Median blood HCV VL
  - Acute: 5.5 (3.8-6.2) log_{10} IU/mL
  - Chronic: 6.6 (6.2-6.9) log_{10} IU/mL

Discussion

- "Ramp-Up period"
- HCV-specific antibodies

Rehermann & Nascimbeni, 2005
Conclusion

- Epidemic of HCV in HIV-MSM is ongoing
- Seminal HCV has been implicated in sexual transmission
- Detection of seminal HCV during acute & chronic HCV-infection reinforces importance of protected sex amongst HIV-MSM
- Future research should focus on analysis of seminal HCV levels during the ‘ramp-up’ phase of acute HCV

Acknowledgements

- Presenter: Sam Turner (samuel.turner@my.jcu.edu.au, +61431686304)
- Principal Investigator: Daniel Fierer
- The team of collaborating researchers at The University of California, San Diego, CA, US: David Smith & Sara Gianella.
- The patients and staff of The Mount Sinai Hospital, New York, NY, US

References