Streptococcus agalactiae ST283 causing invasive sepsis in healthy adults is widespread in SE Asia

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Streptococcus agalactiae

- Streptococcus agalactiae – group B streptococcus, GBS

- Is well known
  - Neonatal sepsis
    - 1960s
  - Sepsis in older adults with co-morbidities
    - 1990s

Different concept

- Invasive
- Healthy
- Younger adults
- Community
Different concept
Singapore outbreak, 2015

Associated – raw fish
Serotype III, ST283
Different concept

• Invasive
• Healthy
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Singapore outbreak, 2015
Associated – raw fish
Serotype III, ST283

Different concept

• Invasive
• Healthy
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• Community

Today
Widespread in SE Asia
For decades

The Singapore GBS outbreak

• Surge of invasive GBS cases
  – ST283

• Literature
  – ST283 cited x 3 times
ST283 cited x 3

- **Humans**
  - Hong Kong
    - 20 cases of invasive disease
    - non-pregnant adults
  - France
    - Two cases, osteoarticular infection
- **Fish**
  - Thailand
  - SLV Vietnam

Literature on ‘absence’

- MLST data (pre 2015)
  - 2,068 isolates
  - None were ST283
- SE Asia under-represented
  - Only 10 GBS isolates

GBS meningitis

- 11 adults
  - 1998
  - Singapore & Hong Kong
  - No co-morbidities
  - 5 assigned ‘ST11’
    - SLV of ST283
- Aust NZ I Med 2000 30 462
- JCM2003 Vol 41 p2530
Hypothesis: ST283 was regional

GBS blood isolates

Weekly cases
Case control studies

<table>
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<tr>
<th></th>
<th>ST283</th>
<th>Non-ST283</th>
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<tr>
<td>Yes</td>
<td>18</td>
<td>8</td>
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<td>No</td>
<td>22</td>
<td>10</td>
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- Yusheng consumption (40) (58) <0.001
  - aOR 11.38 (2.76–46.98)

- Official advisory
  - Avoid Yusheng (a local raw fish delicacy)

Singapore GBS outbreak curve

Clinical

- ST283 146 cases
  - Septic arthritis 30%
  - Meningitis 29%
  - Endocarditis 10%
  - Spinal infection 8.2%
  - Endophthalmitis 4%
A low score means a more healthy person

| Score | ST283 (n=32) | Non-ST283 (n=262) | P>|0.001 |
|-------|--------------|--------------------|--------|
| 0     | 25 (78%)     | 11 (2%)            |        |
| 1     | 28 (88%)     | 13 (5%)            |        |
| 2     | 26 (81%)     | 21 (8%)            |        |
| >=3   | 60 (41%)     | 223 (85%)          |        |

Mortality 3.4% vs 9.5%
ST11 meningitis cases were ST283

- Transcription error
  - In one of the 7 alleles
  - $ST11 = 9$ \text{-} 7-1-3-3-2
  - $ST283 = 9$ \text{-} 7-1-3-3-2

- Corrected to ST283

ST11 meningitis cases were ST283

- Transcription error
  - In one of the 7 alleles
  - ST11 = 9-7-1-3-3-2
  - ST283 = 9-7-1-3-3-2

- Corrected to ST283 1998 ……………. 2015


Historical invasive Singapore

ST283 timeline
Older data from Thailand

- Serotype III
  - Emerging serotype in 2003-2006
  - Caused over 56% of fish disease in multiple sites
  - No ST data
  - The only serotype III to cause outbreaks in fish
    - Is ST283

- Reports of adult onset GBS septic arthritis
  - Without typing data
  - 1990 to 2010
  - 14 of 38 cases had no comorbidities that might predispose to joint infections

Human ST283 is regional; absent elsewhere

Aquaculture ST283 is regional

Summary

- Did not study transmission

ST283
Widespread in SE Asia
Humans and Aquaculture
Absent elsewhere ...

Decades
Interpretation

*Streptococcus agalactiae* is primarily a foodborne infection, associated with aquaculture, in parts of SE Asia

ST283 is hurting people, fish
Economic losses in aquaculture

Further afield

- One human ST283
  - Netherlands
  - No epidemiology

- Outbreak 2016 in six fish farms in Brazil
  - High mortality
  - ST data not reported
  - Limited sequences clustered most closely with JP17
    - JP17 is an ST283 from a tilapia from Thailand

Old literature

Risk Factors for Group B Streptococcal Colonization: Potential for Different Transmission Systems by Capsular Type

- Fish consumption increased risk of acquiring capsular types Ia and Ib combined 7.3 fold (95% CI: 2.34, 19.50).
- Beef and milk were not associated with GBS incidence.

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