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Adding years of healthy life

Asian food-borne outbreak of *Streptococcus agalactiae* serotype III, ST283, from 2001 to 2015

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BACKGROUND

Clinical awareness of unexpected invasive disease due to *Streptococcus agalactiae* (also known as Gp B Streptococcus, GBS) in non-pregnant adults, including bacteraemia, septic arthritis, meningitis and endophthalmitis, prompted us to collate isolates and data from four public hospitals.

We detected and defined a foodborne outbreak of GBS serotype III, ST283 in Singapore in 2015, as subsequently reported by our Ministry of Health.

A local delicacy of *raw freshwater fish was implicated*. Bacteraemic GBS cases had risen to 25 per week but promptly fell to less than 1 per week after a food advisory was issued.

Invasive disease due to foodborne GBS in healthy adults is a new paradigm.

GBS ST283 is extremely unusual in the literature, with one fish isolate and only two human reports, one each from Europe and Hong Kong; neither reporting the association with raw fish. However, there were reports of GBS meningitis amongst non-pregnant adults in Singapore in the 1990s, so we undertook to look for ST283 amongst stored isolates.

PURPOSE

To determine whether GBS ST283 was present in blood cultures from as early as 2001

METHODS

GBS isolates from adult bacteraemic cases stored at -80degC since 2001 were subcultured.

Their identity was checked by MALDI-TOFF (Bruker).

DNA was extracted with an EasyMag instrument (Biomerieux)

Molecular serotyping was by published PCR methods (1,2)

ST283 was determined with an in-house ST283 specific PCR

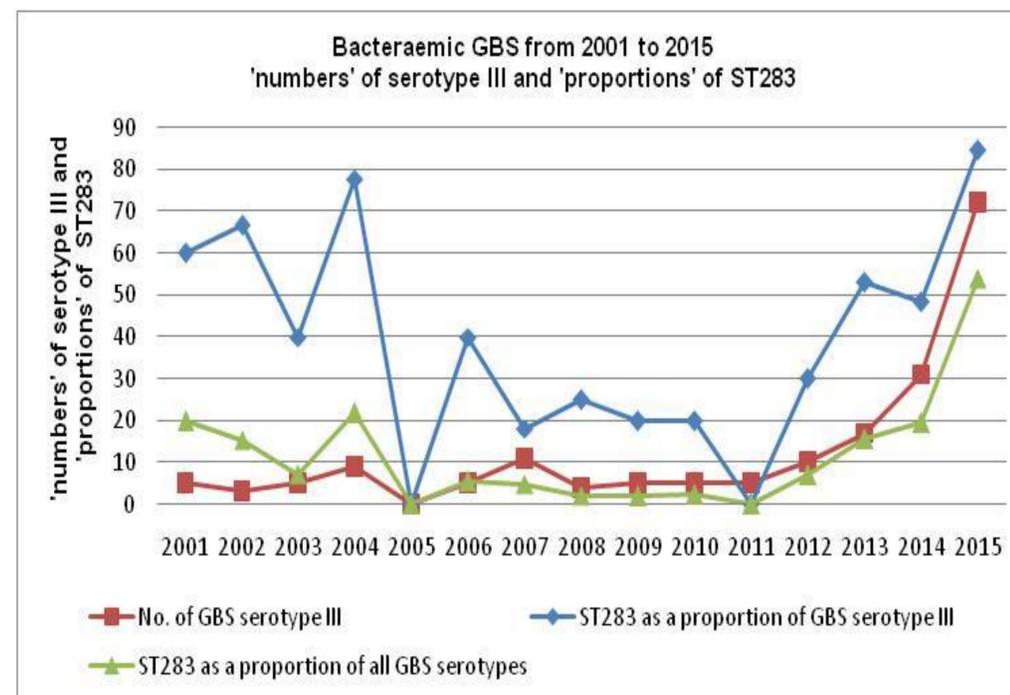
Tetracycline susceptibility testing followed CLSI disc methods.

RESULTS

The figure below shows:

Red - the number of bacteraemic cases of GBS serotype III
Blue - ST283 as a proportion of GBS serotype III
Green - ST283 as a proportion of all GBS serotypes.

All ST283 isolates before 2012 were resistant to tetracycline, apart from one: all those isolated from 2012 onwards were susceptible, apart from one.



CONCLUSION

Invasive GBS ST283 has been present at least since 2001, when banking of isolates began.

If the source has always been the same farmed freshwater fish held responsible for the outbreak in Singapore in 2015, then this data may reflect a chronic outbreak over 20 years.

This may be a regional 20 year outbreak across SE Asia

DISCUSSION

Bacteraemic ST283 has been present since 2001, when banking of isolates began. It may have been present before that. Even in 2001 ST283 constituted 20% of all bacteraemic GBS; wow!

It is not clear why the number of bacteraemic ST283 cases have increased so dramatically since 2012.

Although the numbers of ST283 (derived from blue and red lines in the figure) were much lower in the early years, the figure shows that ST283 accounted for a high proportion of all bacteraemic GBS serotype III from 2001 to 2004 (blue line): this then fell between 2005 and 2011 before a resurgence from 2012 - 2015.

Hypotheses for the increase in absolute numbers as well as this *bi-modal* variation in the proportion of ST283 include climatic explanations, changes in fish suppliers, changes in the fish farming husbandry and pathogenicity / genomic changes.

Tetracycline resistance is a marker of human strains: the change from resistant to susceptible phenotype in 2012, at the same time as ST283 exploded in numerical terms as well as a proportion of all GBS, begs an explanation.

A genomic comparison of earlier isolates with recent isolates is in progress although it has been established that these strains lack the well known hyper-virulent GBS adhesin (HvgA).

FURTHER WORK

Collaborators are invited; contact the PI

We are interested in looking at GBS from invasive disease, excluding neonates, from across SE Asia.

Studies on pathogenicity are also being planned

Ref (1) Teatero S, McGeer A, Low DE, Li A, Demczuk W, Martin I, Fittipaldi N. Characterization of Invasive Group B Streptococcus Strains from the Greater Toronto Area, Canada. J Clin Microbiol. 2014;52(5):1441-1447.

Ref (2) Yao K, Poulsen K, Maione D, Rinaudo D, Baldassarri L, Telford J et al.; The DEVANI Study Group. Capsular Gene Typing of Streptococcus agalactiae Compared to Serotyping by Latex Agglutination. J Clin Microbiol. 2013;51(2):503-507.

'No disclosures'
Poster 1935
Abstract 1660
ECCMID 2017, Austria
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