Non-hemolytic and hemolytic Group B Streptococcus: interactions with cells in vitro
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Background

- Group B Streptococcus is a leading infectious cause of neonatal morbidity and mortality in the US.
- Ascending infection in the mother can cause adverse birth outcomes.
- GBS is defined as being beta-hemolytic, but about three percent of strains are non-hemolytic.
- Recent data suggests that non-hemolytic strains can also pose health risks to infants.
- Previously, we have seen that non-hemolytic strain GB37 displays hemolytic activity in liquid suspension.

- We hypothesize that non-hemolytic strains cause inflammation, oxidative stress, and invasion/adhesion in cells similarly to hemolytic strains.

Methods

Add to

Non-hemolytic and Hemolytic GBS

Cells (Macrophages, Trophoblast, Lung Epithelial)

2-4 h co-culture (M0I of 5)

DCF assay, ELISA (IL-1β), LDH assay, Invasion/adhesion assay

Add to

Red Blood Cells

30 minute co-culture (1x10^9 CFU/mL)

Hemolysis assay

Results

- Figure 1. A909, GB112, GB411 & GB590 show characteristic hemolytic clearance and pigmentation whereas GB37 shows none.

- Figure 2. GBS hemolytic activity correlates to differential cylE expression. A. GB37 upregulates cylE in liquid culture. (Mean +/- SEM, N=3 for GB37, N=2 for remainder) B. GB37 has hemolytic activity in liquid culture. (Mean +/- SEM, N=2)

- Figure 3. GB5 causes IL-1β release in macrophages (THP-1) independent of hemolytic activity. (Mean +/- SEM, N=5, *p<0.05, Friedman’s test)

- Figure 4. GB3 does not cause ROS in either trophoblast cells (HTR-8) or macrophages (THP-1, data not shown). (Mean +/- SEM, N=2)

- Figure 5. Hemolytic GBS invades and adheres to cells better than non-hemolytic GBS. A. GB411 shows more adhesion to trophoblast cells (HTR-8), whereas GB37 invades greater than other strains. (Mean +/- SEM, N=5, two-way ANOVA) B. Non-hemolytic GBS do not adhere to or invade lung epithelial cells (A549) as well as hemolytic GBS. (Mean +/- SEM, N=1)

Conclusions

- GB37 relies on cylE upregulation to cause hemolysis of RBCs in liquid culture.
- IL-1β is released from macrophages independent of hemolytic activity.
- Invasion/adhesion less prominent in non-hemolytic strains, but neither strain type causes cell death.
- Because no significant ROS seems to be produced in response to GBS, ROS is likely not required as a mechanism of GBS-prompted inflammation.

Acknowledgments and References

We thank Lori Keen for her outstanding managerial support, and Dr. Shannon Manning for our GBS strains. We also thank Calvin University and the Wierda family for supporting this research.