Transcriptional Portrait of Actinobacillus pleuropneumoniae during Acute Disease - Potential Strategies for Survival and Persistence in the Host - DTU Orbit (01/01/2019)

Transcriptional Portrait of Actinobacillus pleuropneumoniae during Acute Disease - Potential Strategies for Survival and Persistence in the Host

Background
Gene expression profiles of bacteria in their natural hosts can provide novel insight into the host-pathogen interactions and molecular determinants of bacterial infections. In the present study, the transcriptional profile of the porcine lung pathogen Actinobacillus pleuropneumoniae was monitored during the acute phase of infection in its natural host.

Methodology/Principal Findings
Bacterial expression profiles of A. pleuropneumoniae isolated from lung lesions of 25 infected pigs were compared in samples taken 6, 12, 24 and 48 hours post experimental challenge. Within 6 hours, focal, fibrino hemorrhagic lesions could be observed in the pig lungs, indicating that A. pleuropneumoniae had managed to establish itself successfully in the host. We identified 237 differentially regulated genes likely to encode functions required by the bacteria for colonization and survival in the host. This group was dominated by genes involved in various aspects of energy metabolism, especially anaerobic respiration and carbohydrate metabolism. Remodeling of the bacterial envelope and modifications of posttranslational processing of proteins also appeared to be of importance during early infection. The results suggested that A. pleuropneumoniae is using various strategies to increase its fitness, such as applying Na+ pumps as an alternative way of gaining energy. Furthermore, the transcriptional data provided potential clues as to how A. pleuropneumoniae is able to circumvent host immune factors and survive within the hostile environment of host macrophages. This persistence within macrophages may be related to urease activity, mobilization of various stress responses and active evasion of the host defenses by cell surface sialylation.

Conclusions/Significance
The data presented here highlight the importance of metabolic adjustments to host conditions as virulence factors of infecting microorganisms and help to provide insight into the mechanisms behind the efficient colonization and persistence of A. pleuropneumoniae during acute disease.

General information
State: Published
Organisations: Division of Veterinary Diagnostics and Research, National Veterinary Institute, Microbial Ecology, National Food Institute, Division of Microbiology and Risk Assessment, Bacteriology & Pathology
Contributors: Schou, K. K., Rundsten, C. F., Jensen, T. K., Angen, Ø., Boye, M.
Pages: e35549
Publication date: 2012
Peer-reviewed: Yes

Publication information
Journal: P L o S One
Volume: 7
Issue number: 4
ISSN (Print): 1932-6203
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Scopus rating (2017): CiteScore 3.01 SJR 1.164 SNIP 1.111
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.11 SJR 1.236 SNIP 1.101
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): CiteScore 3.32 SJR 1.427 SNIP 1.136
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 3.54 SJR 1.559 SNIP 1.148
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 3.94 SJR 1.772 SNIP 1.153
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1