Transcriptomic Analysis of *Staphylococcus Aureus* Virulence and Iron-Regulated Genes during Bovine Mastitis

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The human and animal pathogen *Staphylococcus aureus* is involved in intramammary infections in cows, causing milk-safety problems and major economic losses. The bacterium possesses several systems to survive and to proliferate in iron-limited environments such as the infection site. Those systems are subjected to a tight regulation and are expressed only when environmental iron concentrations are beneath the bacterium's needs.

Our previous studies permitted to establish the transcriptional profile of *S. aureus* grown in low-iron environments *in vitro* and *in vivo* in a tissue cage model in mice. The results showed that iron-regulated genes were strongly expressed in the low-iron environment *in vivo* and that the expression of many virulence genes was mostly detected *in vivo*. This demonstrated that the mammalian host environment modulates gene expression in *S. aureus*. In regards to these results, we now want to establish the transcriptional profiles of several strains of *Staphylococcus aureus* during cow mastitis.

Healthy lactating cows will be infected with *S. aureus* and milk will be collected at several points in time. Bacteria will then be quickly isolated from milk and total bacterial RNA will be extracted. RNA will be reverse-transcribed to synthesize fluorescent cDNA probes that will be co-hybridized on DNA chips with cDNA probes derived from bacteria *in vitro* grown *in vitro* as control. The transcriptional profile of bacteria grown *in vivo* in comparison to that obtained *in vitro* should give a strong indication of the relative importance of virulence genes (in particular iron-regulated genes) that are expressed during the infection in the cow.

Implications: The genes strongly expressed during all the phases of infection (mastitis) and that are common to several strains of *S. aureus,* including those causing chronic mastitis, will be considered as important targets for vaccination or antibiotherapy.