Genome blueprint for horse and human vaccines

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Streptococcus equi binds to the equine tonsil. Credit: Professor John Timoney

Two strains of *Streptococcus* bacteria, that have evolved to cause potentially fatal infections in either horses or humans, use the same box of tricks to cause disease. Exploiting their genetic similarities could lead to novel vaccines for both man and beast, according to a review published in the *Journal of Medical Microbiology*.

Streptococcus pyogenes is responsible for tonsillitis, scarlet fever and toxic shock syndrome in humans. Its equine equivalent, *Streptococcus equi*, infects horses to cause a disease called strangles. Each strain is well-

adapted to their particular host yet their strategies for causing disease are remarkably similar.

Strangles is one of the most frequently diagnosed infectious diseases of horses worldwide. There are estimated to be more than 600 outbreaks in the UK each year, each costing up to many thousands of pounds to resolve. *Streptococcus equi* infects the lymph nodes in the head and the neck leading to abscesses that can restrict the airways – giving the disease its name.

The secret to the success of *S. equi* is its ability to trade genes with similar bacteria such as *S. pyogenes*, explained Dr Andrew Waller from the Animal Health Trust, who conducted the review focusing on *S. equi*. "These strains share clever tricks, like secreting 'superantigens' that allow the microbes to send the immune system into turmoil yet avoid detection themselves," he said. Another shared trait is the production of SlaA – a toxin related to the venom of the Australian brown snake - that is associated with serious disease in humans. "The resemblances between the two strains prove it is unrealistic to study human and animal pathogens in isolation, in our quest to understand and fight them," stressed Dr Waller.

Data shows that the number of cases of serious, invasive *S. pyogenes* infection has increased in recent years in England "Tracking the genetic evolution of micro-organisms such as *S. equi* will give us clues as to how its human counterpart *S. pyogenes* has evolved in the past and may evolve in the future. This will help equip us with the tools to combat the diseases caused by both pathogens," explained Dr Waller.

The emerging genetic data of *S. equi* is being used as a blueprint to develop a new vaccine against strangles, which ultimately could benefit both horses and humans. "One vaccine against strangles that is currently being trialed uses antigenic components that share similarity with their *S.*

pyogenes counterparts to stimulate immunity," said Dr Waller. "If this approach can protect horses against *S. equi*, it is feasible that a similar cocktail of *S. pyogenes* antigens may be the basis for an effective vaccine for humans, which is an exciting prospect."

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