A Molecular Study On Hemorrhagic Anovulatory Follicles

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This study uses a cutting-edge method called immunopeptidomics to understand how horse lung cells respond to the harmful bacteria, Rhodococcus equi, the results will help in vaccine development.

We propose the use of a new cutting-edge research method, immunopeptidomics, to understand how a horse's lung cells combat this bacterium when it becomes infected. We will use mass spectrometers to look at small peptides from the bacterium that are presented by the horse's cells. These peptides are like little flags that tell the immune system, "Hey, there's an infection here, come and take care of it!"

For this initial application of equine immunopeptidomics, we will focus on Rhodococcus equi (R. equi), a bacterium that causes pneumonia in foals. This poses a significant challenge for horse-breeding farms. Currently, no vaccine exists to prevent this disease, and available treatments are often inadequate or ineffective.

The primary objective of this research is to develop a novel approach to studying bacterial peptides in horses. We aim to identify which ones appear when the horse's cells are infected with R. equi. By doing this, we hope to determine which parts of the bacterium the horse's immune system presents most frequently. This could help develop a more effective vaccine to combat the bacterium.

Why this is important:
   - Understanding the horse's immune system:
   By studying the immune cells, we can learn how a horse's cells fight off an infection. This knowledge could also help us to find better treatments.
   - Finding New antigens against R. equi:
   This research might uncover new things that can be used in the fight against R. equi,

Importance to Industry: We're developing a new method called immunopeptidomics to study how the horse's immune system responds when its infected with R. equi. We're examining tiny pieces of the bacteria (peptides) that appear on the horse's cells during the infection. These peptides help the immune system to recognize and fight the bacteria. By identifying these peptides during the infection, we can determine which parts of the bacteria might be good targets for a vaccine. For this initial application of equine immunopeptidomics, we will focus on Rhodococcus equi (R. equi), a bacterium that can cause pneumonia in foals. This is a big problem for farms that breed horses. Currently, there is no vaccine to prevent this illness, and the medications used to treat it are not always the most effective.

Our study involves studying these peptides in healthy horse cells and in cells infected with R. equi. We utilize specialized tools, such as mass spectrometry, to accomplish this. We infect horse macrophages (a type of immune cell) with R. equi to identify the peptides that are expressed.

Once we identify these peptides, we can determine which parts of R. equi they originate from. This helps us rank which parts of the bacteria could be used in a vaccine because the more peptides we find, the more important that part might be.

Our research supports efforts to improve vaccines against R. equi. It also helps us understand how the horse's cells talk to the immune system when they're infected. This could lead to the development of better vaccines, and ultimately, it could make horse farming healthier and more cost-effective.