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Unraveling the Role of Long Noncoding RNAs in Viral Diseases of Chickens

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DESCRIPTION

Long noncoding RNAs (lncRNAs) have emerged as critical regulators of gene expression and cellular processes, particularly in the context of viral diseases affecting chickens. As poultry are vital to global agriculture and food security, understanding the molecular mechanisms underlying viral infections in these animals is essential. Viral pathogens, including avian influenza virus, infectious bronchitis virus, and Marek's disease virus, pose significant threats to poultry health and production. Research has increasingly focused on the role of lncRNAs in modulating immune responses, influencing viral replication, and determining disease outcomes in chickens. LncRNAs are defined as RNA molecules longer than 200 nucleotides that do not code for proteins. They are involved in various biological functions, including chromatin remodeling, transcriptional regulation, and post-transcriptional modifications. In chickens, lncRNAs can interact with DNA, RNA, and proteins, thereby influencing gene expression at multiple levels. Their expression profiles can change in response to viral infections, suggesting that they play a role in the host's antiviral response. One of the key functions of lncRNAs during viral infections is their involvement in the immune response. For instance, specific lncRNAs have been shown to modulate the expression of interferons and other cytokines, which are crucial for initiating and regulating the immune response to viral pathogens. In chickens infected with viruses like avian influenza, certain lncRNAs can enhance the expression of antiviral genes, thereby promoting an effective immune response. Conversely, some lncRNAs may act as negative regulators, dampening the immune response and allowing the virus to replicate more efficiently. This duality highlights the complexity of lncRNA functions and their potential to influence the outcome of viral infections. In addition to modulating immune responses, lncRNAs can directly affect viral replication. Research has identified lncRNAs that interact with viral RNA or proteins, potentially influencing the lifecycle of the virus. For example, certain lncRNAs may serve as molecular scaffolds, facilitating the assembly of viral replication complexes or promoting the stability of viral RNA. This interaction can lead to increased viral load in infected chickens, resulting in more severe disease outcomes. Understanding these mechanisms is crucial for developing therapeutic strategies aimed at mitigating viral infections in poultry. The role of lncRNAs in viral diseases also extends to their potential as biomarkers for disease susceptibility and progression. By profiling the expression of specific lncRNAs in chickens, researchers may identify patterns associated with increased susceptibility to certain viral infections. For instance, lncRNAs that are upregulated in response to infection could serve as early indicators of viral disease, allowing for timely interventions. Conversely, lncRNAs that are downregulated during infection might indicate immune evasion by the virus. This information could be invaluable for breeders aiming to enhance disease resistance in poultry populations. Moreover, lncRNAs have potential applications in developing novel antiviral strategies. By targeting specific lncRNAs that facilitate viral replication or immune evasion, it may be possible to design therapeutic interventions that enhance the host's ability to combat viral infections. This approach could complement traditional vaccination strategies, providing a multifaceted defense against viral pathogens in chickens. The study of lncRNAs in chicken viral diseases is still in its early stages, but the findings thus far underscore their importance in understanding viral pathogenesis and host responses.

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CONFLICT OF INTEREST

The author declares there is no conflict of interest in publishing this article.

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