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Understanding the Dynamics of Respiratory and Gut Microbiome during Respiratory Syncytial Virus Infection: A Systematic Review

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Introduction

Respiratory Syncytial Virus (RSV) infection is a significant cause of respiratory illness, particularly in infants and young children worldwide. While the pathogenesis of RSV infection primarily targets the respiratory tract, emerging evidence suggests intricate interactions between the respiratory and gut microbiomes during infection. This systematic review aims to explore the changes in the respiratory and gut microbiome dynamics during RSV infection.

RSV is a single-stranded RNA virus belonging to the Paramyxoviridae family. It primarily infects epithelial cells of the respiratory tract, causing symptoms ranging from mild cold-like symptoms to severe lower respiratory tract infections, such as bronchiolitis and pneumonia, especially in vulnerable populations like infants, elderly, and immunocompromised individuals. Dysbiosis in the Respiratory Tract: Studies have shown alterations in the respiratory microbiome composition during RSV infection, characterized by decreased microbial diversity and abundance of commensal bacteria such as Streptococcus and Haemophilus. These changes may contribute to the susceptibility to secondary bacterial infections [1].

RSV infection disrupts the host immune response, leading to dysregulated inflammation and impaired antiviral defense mechanisms. This dysregulation can further influence the respiratory microbiome composition and exacerbate disease severity. The composition of the respiratory microbiome during RSV infection has been linked to disease severity, with certain microbial profiles associated with increased risk of developing severe respiratory complications [2].

Description

Emerging evidence suggests a bidirectional communication between the gut and respiratory tract, known as the gut-lung axis. Disruption of the gut microbiome composition during RSV infection may influence immune responses in the respiratory tract and contribute to disease progression. RSV infection has been associated with changes in the gut microbiome, including decreased microbial diversity and alterations in the abundance of specific bacterial taxa. These changes may have implications for immune function and susceptibility to respiratory infections [3].

The gut microbiome plays a crucial role in modulating host immune responses. Dysbiosis induced by RSV infection may impair immune function, leading to increased susceptibility to secondary infections and exacerbation of respiratory symptoms. Modulating the gut microbiome through the administration of probiotics or prebiotics holds promise as a therapeutic strategy for RSV infection. These interventions may help restore microbial balance, enhance immune function, and reduce the risk of severe respiratory complications [4].

Targeting dysbiotic microbial communities with antibiotics or antivirals may help mitigate the risk of secondary bacterial infections and alleviate respiratory symptoms during RSV infection. However, careful consideration of potential adverse effects and antibiotic resistance is necessary [5].

Conclusion

RSV infection is associated with significant alterations in both the respiratory and gut microbiomes, which may influence disease severity and outcomes. Understanding the dynamics of microbiome changes during RSV infection is crucial for developing effective therapeutic interventions and improving clinical management strategies. Further research is warranted to elucidate the underlying mechanisms driving microbiome dysbiosis and its impact on RSV pathogenesis.

Acknowledgement

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Conflict of Interest

None.

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