

Early-life Lung and Gut Microbiota and RSV Infection: What is the Connection?

Respiratory Syncytial Virus (RSV) infection has been considered as the most prominent cause of bronchiolitis till six months of age. Although prematurity is an independent risk factor for bronchiolitis, but the severity of the disease varies in different individuals, proposing that there may be some other factors (extrinsic or intrinsic), that contribute to differential response to same viral infection and severe-RSV disease in some individuals.

Coming to that, various epidemiological and experimental studies have linked dysbiosis of microbiota in early-life with the risk and severity of disease in later life. Scientific studies have recently compared respiratory and gut microbiome in healthy subjects and in those with respiratory infections/diseases; and evidence from these studies have reported remarkable difference in composition of microbiota in health and disease.

To understand the dynamics of lung microbiome and RSV infection, researchers conducted studies and deduced that- hospitalization for RSV infection was linked with increased abundance of *Haemophilus influenzae* and *Streptococcus* and was inversely related to *Staphylococcus aureus*. Further, children who later developed recurrent wheezing have abundance of *Haemophilus*, *Moraxella*, and *Klebsiella* in comparison to healthy subjects.

Additionally, association between gut microbiome and RSV infection was also studied extensively. There was a significant difference in the overall composition of microbiome between the RSV-infected subjects and the controls. In moderate to severe cases of RSV-infected infants, there was significant enrichment of *Odoribacteraceae*, *Clostridiales*, *Lactobacillaceae*, and *Actinomyces*. Similarly, *Bacteroides*-dominant profile showed close relation to development of bronchiolitis.

To further establish the role of gut microbiome, researchers tried probiotic supplementation in experimental models and found attenuated immune responses to RSV. The gut and lung microbiomes may promote maturation of the immune system and subsequently control the development of inflammatory diseases like severe RSV and asthma, and similar association was also found in the off-springs of probiotic-supplemented mothers.

Thus, it can be concluded that gut and lung microbiomes are significant players in shaping the immune system. Therefore, interventional therapies comprising prebiotics and probiotics may enhance development and activation of immune system early in life.

Clinical Catch

- *Gut and lung microbiomes are significant players in shaping the immune system*
- *Prebiotics and probiotics may enhance development and activation of immune system early in life*

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