Do Microbes Care About Human Heart?

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A Commentary on: Understanding the functional interactions between microbes and human metabolism could potentially reduce the risk of Heart Disease.

Commentary Report

Heart disease, or cardiovascular disease (CVD) is widely recognized as an inflammatory disease. CVD encompasses a wide range of conditions in humans, including diseases in heart blood vessel such as coronary artery disease (CAD), abnormal heart rhythm (arrhythmias) and congenital heart defects (CHD) [1]. According to the Center for Disease Control and Prevention (CDC), CAD is among the most common type of heart disease to humans, which is highly prevalent in the United States (http://www.cdc.gov/heartdisease/). CAD occurs mainly due to accumulation of low-density lipoproteins and cholesterol in arteries resulting in 'atheromatous plaque' – a disease condition called Arteriosclerosis. Plaque buildup in arterial walls can cause ischemia (restriction of blood), leading to obstruction of peripheral arteries, congestive heart failure, heart attack and stroke in humans. Another cause of heart disease is an arrhythmia, a condition where the heart beats too fast (tachycardia) or too slow (bradycardia) or too early (premature contraction) or too irregularly (fibrillation). Heart disease may also be caused by problems in the structure of heart that is present at birth, known as CHD. CHD changes the normal flow of blood through the heart. Recent statistics suggest that 8 out of every 1,000 newborns are affected with CHD. According to the National Heart, Lung and Blood Institutes (NHLBI) at National Institutes of Health, every year more than 35,000 babies are born with CHD and more than 1 million babies are born in the United States, Tel: +1301-674-3108; E-mail: pushpanathan31@gmail.com

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the risk of CVD. Maternal transmission of microbes in humans has attracted considerable attention in the recent years that helps to understand the vertical transmission of microbiome from mother to infant. Recent studies have suggested that infants incorporate an initial microbiome from birth and receives copious supplementation of maternal microbes through birth and breast feeding [7]. Like genetic inheritance of genes, neonatal complications of CVD might also be due to vertical transmission of altered microbiome from infected mothers to off springs (Figure 1).

The knowledge about the functional interactions between human microbiome and immune system is still at the stage of infancy. However, understanding the microbial community structure and their functional interactions with immune systems of both CVD patients and healthy individual will provide deeper insights into the mechanistic relationship between host-microbiome interactions and unravel the potential risks of human developing CVD. The way of integrating strategies such as microbial community profiling, transcriptomics and metabolomics can be efficient, which will provide global understanding of changing pattern of microorganisms, host-microbiome interactions, regulation of inflammatory/infection pathways, and the interactions between microbiome and immune systems . These approaches will help us to understand the major

Figure 1: Causes, transmission and control of CVD. (a) Risk factors− induced alteration in microbiome and maternal transmission of altered microbiome from patients to new born babies (b) Strategies for the development of personalized therapy to treat and manage CVD.
underlying cause for CVD and also identify potential therapeutic targets for the development of personalized therapy to manage and treat CVD.

References

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