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Zebrafish genes linked to human respiratory diseases'

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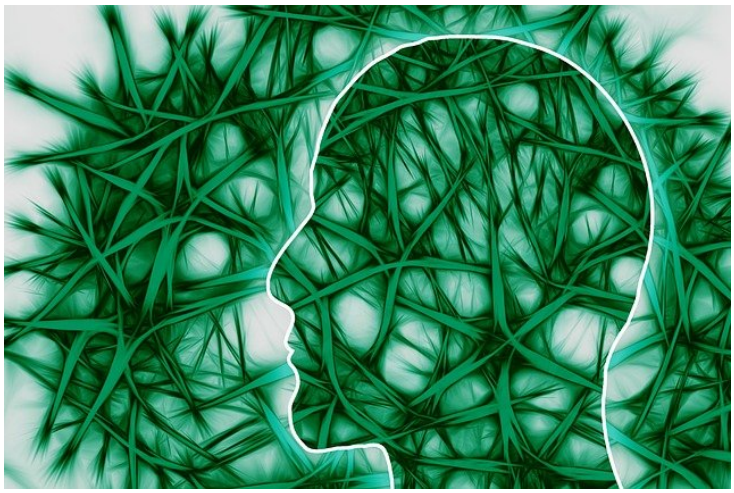

Singapore: A small freshwater fish found in many tropical aquariums may hold the key to unlocking one of the leading causes of respiratory diseases in humans, according to scientists from A*STAR's Institute of Molecular and Cell Biology (IMCB).

The scientists have identified hundreds of novel genes in the zebrafish that could be functionally identical to the human genes required for forming motile cilia, hair-like structures on the surface of airway cells. These are required for removing dust and pathogens from the human airway. The study showed that the loss of these genes is linked to development of defective motile cilia, which could be the cause of some respiratory diseases.

Primary Ciliary Dyskinesia (PCD) is a rare genetic disorder which results in defective motile cilia within the human airway. Defective motile cilia cannot function properly to remove dust and bacteria from the lungs, leading to a range of respiratory problems, including chronic lung infections such as bronchitis and pneumonia, and in more severe cases, causes long term damage to the airway.

"There is no cure for PCD. Doctors can only prescribe aggressive treatments to slow the progress of airway damage and address the respiratory issues resulting from PCD. It is therefore important to identify the genes responsible in a precise manner and diagnose the condition early," said Dr Sudipto Roy, Senior Principal Investigator, IMCB and the lead scientist for the study. "Our collection of genes will be invaluable for understanding how cilia are made and what cause them to be defective. They are important clues for understanding cilia-related diseases, and to develop future treatments," he added.

Professor Hong Wanjin, Executive Director of IMCB, said, "Developmental biology seeks to understand the basic principles governing the development of humans and how the emergence of complexities can be implicated in human diseases. This is exemplified in our study, which has uncovered the links between human diseases and the genes involved in cilia formation. Such foundational research is crucial as practical applications of research outcomes need to be grounded in fundamental science."