‘Fishing the fats in zebrafish’- to understand the coronary heart disease

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Coronary heart disease (CHD) is the single most common cause of death in Westernized societies, and its prevalence is rapidly rising in developing countries too. In CHD, the blood vessels supplying blood and oxygen to the heart gradually become narrow due to accumulation of fats in the walls of blood vessels. Over time, the accumulated fats occupy the entire blood vessel and block the flow of blood and oxygen to the heart causing heart attacks that can lead to death. CHD can be caused by lifestyle habits such as eating fat-rich food, smoking, alcohol use, and physical inactivity which trigger several genetic modifications that alter the normal functions of genes. Some of these genetic modifications are suspected to play a role in accumulation of fats inside the blood vessels leading to CHD. Our ultimate aim is to identify the CHD-causing genetic modifications and understand the mechanism by which they stimulate the accumulation of fats.

To understand a human disease, scientists cannot perform the initial research in humans for ethical reasons. Hence scientists rely on various animals that respond in a human-like way while researching a human disease. In our case, we chose zebrafish to model human CHD, because like humans, zebrafish accumulate fats in blood vessels when fed with fat-rich food. By feeding fat-rich food to zebrafish that possess the genetic modification commonly found in CHD patients, we wanted to investigate whether that genetic modification will increase or decrease fat accumulation in the blood vessels of zebrafish. In this way, among the several genetic modifications caused by the risk factors of CHD, the influential genetic causes can be identified and understood. Before starting to identify and understand the CHD-causing genetic modifications using zebrafish, here I tested three dyes, namely Nile red, MDH and Bodipy, which allow visualizing and measuring accumulated fats in blood vessels of zebrafish. Each of these dyes binds to fats and makes fats glitter under a specific light like a radium jacket on a person glitters in light making the person identifiable. In conclusion, during my research work I found that the dyes Nile red, MDH and BODIPY are capable of localizing the fats in zebrafish. These dyes enable us to measure the impact of genetic modifications in zebrafish on the accumulation of fats. Hopefully in the future, with the aid of these dyes, we will be able to identify and understand at least some of the novel CHD-causing genetic modifications.

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