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Podcast Title: Zebrafish as a model for Human
Research

Department: Microbiology

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TRANSCRIPT

Hello everyone, This is Dr Sunil Shivekar, Associate professor of Microbiology, SMVMCH, talking about “Zebrafish as a model for Human Research”

For many years, the use of animals for human research has been debated, and have raised various ethical concerns over the animal cruelty, welfare, pain management and replacement. Many organizations, boards and committees had demanded strict rules and regulations regarding the use of animals for human research. Some of them argue that alternatives like computer models, cell cultures, or human-based studies should be prioritized over animal experimentation whenever possible.

In 1964, the Indian parliament has formed a committee for the purpose of control and supervision of experiments on animals under the prevention of cruelty to the animal act 1960. Soon after the charge committee has come up with the principles of three R in animal experiments. The principle of the Three Rs—Replacement, Reduction, and Refinement is often cited as a guide to using fewer animals in research and minimizing their suffering. Zebrafish (*Danio rerio*) have gained popularity as an emerging model organism in medical research due to several advantages they offer.

Zebrafish a fresh water fish is primarily observed in north eastern part of Asia. This five striped fish first time used by Dr George S. for human research and since then it has been widely used as

a model for studying human disease due to several reasons

Zebrafish share a significant portion of their genes with humans, enabling researchers to study genes and genetic mutations that might cause diseases or have therapeutic potential. The embryos of Zebrafish are transparent, which allow the direct observation of developmental processes. This transparency also aids in studying organ formation, tissue development, and disease progression. The embryos also develop quickly, with many organs becoming functional within a short period. This rapid development enables researchers to observe the effects of intervention in a relatively shorter time. The Zebrafish possess a remarkable ability to regenerate damaged tissues and organs throughout their life. Understanding this process in zebrafish may offer insights into potential regenerative therapies for humans. It has observed that many biological pathways and processes are conserved between zebrafish & humans. Studying these pathways in zebrafish can provide insights into human disease mechanisms and potential treatments.

Researchers from all over the world has started use of zebrafish in various areas of medical research, including

Developmental Biology: Studying embryonic development and organ formation.

Genetics and Genomics: Investigating the role of genes in disease development and progression.

Drug Screening: Testing potential drugs or compounds for efficacy and safety.

Cancer Research: Understanding cancer biology, tumor formation, and testing anti-cancer therapies.

Neuroscience: Exploring the nervous system development, neural disorders, and brain function.

Cardiovascular Research: Studying heart development, heart diseases, and drug effects on the cardiovascular system.

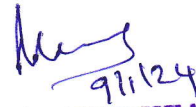
The zebrafish genome-sequencing project was initiated at the Wellcome Trust Sanger Institute in 2001. Soon after completion it has found that 70% of protein coding genes of human are found in Zebrafish and 84% of genes associated with human diseases are found in Zebrafish. These genes can be cloned from somatic cells and made transgenic. The zebrafish genomic data is available for researchers on various database sites, which is freely available for researchers all

over the world

Overall, the zebrafish's genetic similarity to humans, coupled with its ease of maintenance, cost-effectiveness, and adaptability for genetic manipulation, make it a valuable model organism for various human research applications.



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