

Nobel Prize in Physiology or Medicine

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Context : The 2024 Nobel Prize in Physiology or Medicine was awarded on **October 7** to **Victor Ambros** and **Gary Ruvkun** for their groundbreaking discoveries in gene regulation and the role of **microRNAs**.

Key Takeaways:

1. **MicroRNAs:**

MicroRNAs are molecules that help cells regulate their protein production. They achieve this by binding to messenger RNA (mRNA), which carries instructions for synthesizing proteins. By doing so, microRNAs control which proteins are produced in the cell.

2. **Gene Regulation and Cell Differentiation:**

Although every cell contains the same set of genes within its chromosomes, different cell types (such as muscle and nerve cells) have distinct characteristics. This difference is due to gene regulation, which enables cells to activate only the genes relevant to their specific functions.

3. **An Example to Understand Gene Regulation:**

Imagine chromosomes, which carry genetic information, as a toolbox. Every cell in the body has the same toolbox filled with identical tools (genes). However, different cells use different tools based on their functions. A nerve cell might use a tool for transmitting signals, while a muscle cell picks one for movement. Gene regulation is the process that allows each cell to choose the right tools, activating only the appropriate genes for its role. Ambros and Ruvkun's curiosity about how gene regulation works led to their discovery of microRNAs.

4. **Importance of Gene Regulation:**

Errors in gene regulation can lead to serious conditions such as cancer, diabetes, or autoimmune diseases. Understanding this process is key to discovering potential treatments for these diseases.

5. **The Discovery:**

Ambros and Ruvkun made their discovery while studying a tiny roundworm called *Caenorhabditis elegans*, which shares some cell types with more complex organisms. By examining two mutant strains of the worm, *lin-4* and *lin-14*, which had defects in the timing of gene activation during development, they uncovered the existence of microRNAs and

gained insight into gene regulation.

Dr. Shivakumar's



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